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EDITORIAL.

THE NOTES ON traveling in Alaska, given on another page, will convey to many readers different ideas of the Far North from those they have been accustomed to entertain. They furnish interesting reading, and impress one with the fact that they are actual results of experience in Alaska and the Yukon.

IT IS ANNOUNCED that, in response to the memorial sent to Washington by the California Miners' Association, the Geological Survey will be directed to make an examination of the valleys of the Sacramento and San Joaquin rivers. The object is to ascertain whether any satisfactory settlement of the débris question can be reached, and to determine what measures are required to prevent further obstructions in San Francisco bay. The shoaling of the waters of the bay is a serious matter and requires attention. To determine how far mining operations are responsible is also a point requiring careful investigation.

THE PRODUCTION of coal in Great Britain had only a moderate increase last year. The total, as given by the official report, recently published, was 232,411,784 long tons, and the gain over 1903 was 2,087,489 tons, or 0.9 per cent. There were no serious strikes or other interruptions to the working of the mines, so that the slight extent of the change was due to a moderate increase in demand, which was to be expected from business conditions during the year. In 1904 there were 48,250,280 tons of coal exported to foreign countries, while 17,190,900 tons were sent abroad for the use of steamers engaged in foreign trade, so that a total of 65,441,180 tons, or 28.2 per cent of the coal mined, was consumed beyond the limits of the United Kingdom.

IN VIEW of the growing necessity for fine grinding, with a view to better extraction in cyanidation, the question of more efficient slime-filtering must become important. The Moore process is known to have done good work in South Dakota, and it is now being installed in one large plant at Telluride. In a recent issue we described a new candidate for attention, namely, the Ogle filter; this has at least the merit of maintaining the

process continuously, something which the successful machine must meet and conquer. If this type of machine can also meet the further requirements of endurance, low repair, and large tonnage, it will offer a rich field for invention. But no such device can spring forth complete from the start; the slime-filter must take its turn, in submission to successive improvements, until the perfect operation shall be reached. Meanwhile the profession is actually waiting for the needed device. Probably at no time in the history of gold and silver milling, has such a vast and varied capital been compelled to wait for a known want, such as the simple, effective, and cheap slime-filter for cyanidation.

AMONG THE BILLS pending before the legislature now in session at Albany is one compelling mining companies to file a statement with the Secretary of State. The proposed law is a copy of that which was passed a couple of years ago by the legislature of Connecticut. The effect is to prohibit the sale of stock in mining companies the officials of which have failed to file "in the office of the Secretary of State a statement or certificate showing the financial condition of such corporation; the location of the mine or mines or oil properties owned by such corporation, with plans of the same, the amount of work done thereon, the amount of cash expended for improvements thereon and the condition of the plant and machinery connected therewith." Such statement must be made under oath; a fee of $25 is levied; and each offense against the law is punishable with a fine of $100.

While the intent appears to be to check the operations of irresponsible fiscal agents and those other sundry touts of swindles which disfigure mining, the law is likely to prove ineffective, simply because it specifies that the shares are such as shall be sold "by such corporation or by any person or firm acting as agent or broker for such corporation." There is an easy way out of this, simply by the transfer of stock from the corporation to an individual, who will then carry on his nefarious trade unhindered, so long as it cannot be proved that he is acting as agent for the corporation. Any steps which will protect the investing public to the extent of rendering mere pilfering illegal, any law which will hinder the depredations of men who abuse the conventions of civilization to prey upon the community, will deserve support; but it is evident up to date that the amount of skill applied to the protection of the public is not equal to that on the side of piracy.

FOR SOME MONTHS the superintendent of the Washoe smelter at Anaconda, Montana, has been building a new copper furnace. It is made by joining two large blast-furnaces, each 56 in. by 180 in. at the tuyeres. The space between the furnaces, which will be taken in and made the central part of the new one, is about 15 ft.; so that the new furnace, in rough measurement, should be about 56 in. by over 500 in. The capacity for this is estimated at 1,600 tons per diem, which will be at the rate of eight tons per square foot of smelting area.

The advantages should be many, notably in cost of charging, in labor expense of running, in stability of action, and in length of campaign. The results will be watched with interest, for this same superintendent, Mr. E. P. Mathewson, at this same plant has already not only built the largest and most economical reverberatory furnaces in the world, but he has also effected a great saving in the heat formerly wasted from these same furnaces by harnessing them to Stirling boilers. It will be interesting to know whether there is a practical limit in the ratio of efficiency to size; and, if so, whether a smelting area of 56 by 500 in. is near it.

THE NEW OFFICE buildings on London Wall constitute an important part of the architectural improvements which have been made during recent years in the world's mining center. Salisbury House, London Wall Buildings, Broad Street Place and 62 London Wall afford offices to many of the mining men of London. The new buildings are only five or six stories high; they have permitted, therefore, an architectural treatment impossible in the case of our steel sky-scrapers. They are stone buildings of the older type, of pleasing proportions and attractive front, three of them constituting a group finer than anything which we have in New York. In their way, in being built of stone, in their architectural value, in their quietly substantial appearance, in the charming character of the office rooms, in the slowness of the lifts and the slowness of head marking many of the lift attendants, these buildings are as typical of the other side as the splendid, but unlovely, steel structures, twenty to thirty stories high, only faced with stone, with elevators traveling 300 ft. per minute, and attendants smart, but mannerless, are characteristic of the relentless activity which marks New York.

Washington.

Washington bids fair to become a favorite domicile for mining engineers, especially those who are in a position to take the *otium cum dignitate,* the occasional important piece of work amid a life of measured tranquillity. Mr. Henry C. Perkins was among the earliest in the first flight of professional men to take up residence in the District of Columbia; then came Mr. Gardner F. Williams, formerly of Oakland, and later of Kimberley; more recently Mr. A. A. Blow, of Leadville and the Sheba, has settled among the national legislators; and now Mr. Hennen Jennings, having known what it is to live in California, South Africa and England, has elected to reside there.

It is no secret that Mr. Jennings has severed his conection with Wernher, Beit & Company; and that, after eighteen years' absence from his native country, he has returned, mainly for the sake of the education of his sons, but also to avoid the smoke-laden fogs of the English metropolis. And it is only for us to congratulate these gentlemen for their good sense in choosing to live at Washington. Proud as we are of the commercial greatness of New York—the type of American energy and aggressiveness—we have restless moments when the scientific and diplomatic atmosphere of Washington seems as a quiet hillside overlooking the dusty plains. But the diplomatic and political features of life in the southern city will be to mining engineers an influence less tangible than the scientific culture of their geological friends. The chiefs of the United States Geological Survey have ever been as comrades in arms with the mining engineers in their conquest of nature; and, assuredly, it will afford no little satisfaction to both to be able to meet and revive the memories of days "when the world was young and life an epic." It needed but Clarence King to preside!

The Life of a Report.

A corporation called the American Nickel Company prints the report of Cosmé Puig in November, 1904; this report was written and dated, March 14, 1893. Without reference to any other feature of this statement of fact, we desire to use it as a text for a discussion of the length of period required to render a report valueless.

It is a misfortune, which has befallen many a mining engineer, to have his opinion quoted, without his consent, long after the development of the mine itself has altered the conditions on which his opinion was based. To protest is usually impracticable. Legal measures are expensive, even where they are possible; to compel the persons misusing the report to publish an apology is almost useless, because the correction will not reach the people who have been misled; moreover, the measures taken by an engineer to defend his reputation may injure innocent people, even when his action does not contemplate financial compensation. Obviously, it is a wrong which, once done, it is difficult to repair. The most effective preventative will be to educate the investing public into the recognition of the fact that a report deals with conditions as they exist at a given time, so that investors may know what value to place upon such a report when it is quoted long after the mine has been worked out, the price of the metal has changed, or other disturbing factors have upset the entire basis of the estimate. To those who guide the investor it should be evident that the usefulness of a report, in so far as it is the appraisal of a mine, must depend upon the size and general character of the ore developed. A prospect looks different from day to day; in a month or two a young mine may afford proof of being short-lived; an equal period may be long enough to determine that it has the making of a big thing; on the other hand, a property well opened up, with miles of workings and a great number of faces in ore, may require marked and continuous change extending over a period of a year before it can be said to warrant a reconsidered estimate of value. Large bodies of low-grade ore are a safeguard against violent fluctuations; while small veins of rich ore, warranting high expectations, are most liable to give rise to unexpected disappointments.

Thus conditions differ, and yet not enough to forbid certain generalizations. Except with the express sanction of the engineer who prepared it, no report should be quoted later than twelve months after it was written; in small mines, six months is a sufficient limit. If a mine has been under exploitation during the interval, a year is sufficient to rob a report of all but its historic and, possibly, scientific value—historic, as stating what has been; scientific, as describing geologic or metallurgic conditions which may still survive. If a mine has been idle, the report upon it, after a year, may still apply, if the price of the metal in the case, the conditions of transport and other basic factors have not changed appreciably. Therefore, to quote a report made in 1893, as germane to the commercial value of a mine in 1904, is rank absurdity.

Pennsylvania Miners'CertificateLaw.

The decision on the validity of the Pennsylvania law requiring all miners in the anthracite region to hold certificates of competence, is one which may be of much importance, in certain contingencies. The main point really at issue is the provision requiring two years' work as laborer, or in other subordinate position, in the anthracite mines of Pennsylvania, as a pre-requisite to the issue of a certificate. This was contested as being a violation of the fourteenth amendment to the Constitution of the United States, which prohibits discrimination by any State against the citizens of another State. The discrimination claimed is that the experience required must have been obtained in the mines of Pennsylvania; work in another State not being allowed to count. The court, however, ruled that there was no discrimination, since the regulation is binding against citizens of Pennsylvania, as well as those of other States. It is quite probable that appeal will be taken from this decision to the Supreme Court; possibly to the Federal Courts.

The real point in the case, of course, is that, in case of another strike of the anthracite miners, this law will prevent the companies from bringing in miners from elsewhere. No man, whatever his experience, can obtain a miner's certificate unless he can prove the two years' work in Pennsylvania. It would be illegal for a company to bring in miners from Ohio, or Illinois, or Alabama, for instance, as they could obtain no certificates. This gives the miners' organization an important advantage, in case of a strike, and one which they are not disposed to relinquish. That another strike is possible—perhaps probable—when the present agreement expires, is quite a general opinion. The present suit over the certificate law has something of the character of a preliminary skirmish.

Kansas Coal Mine Explosions.

On another page of this issue we give an extended abstract of the report of the commission recently appointed to investigate the causes of explosions in the coal mines of the southeastern field in Kansas. Accidents in that field have been quite frequent during the past year, causing some loss of life and considerable damage to property, the result being that the legislature directed the appointment of a special commission to consider the subject. The report is preliminary in its nature, the time allowed for its preparation being short, and closes with a recommendation for a further investigation, for which a year is to be allowed. On the new commission the operators of the State are to be represented.

The mines of Kansas are not fiery, gas being usually present only in small quantities, not sufficient to cause an explosion by itself, though it might assist in the explosive combustion of dust under certain conditions. The report attributes the accidents in question, so far as investigation has gone, to coal dust alone, and suggests certain measures for their prevention, which seem generally well considered. In some points, however, it does not seem to have gone for enough. The causes of the explosions seem to have been chiefly two —carelessness in placing shots and poor ventilation.

The first is undoubtedly the chief reason. The miner is most interested in securing the largest quantity of coal to his credit. He is apt to make his holes as deep as possible, and to use an excessive quantity of powder. He does not take the resulting risk, as that falls to the shotfirer. In tamping also he is likely to take the material which is most convenient, and that may be coal dust and waste, which will be blown out of the hole in an ignited condition, and may, or may not, start an explosion, according to the condition of the mine. We do not mean to

say that there are no careful or thoughtful miners; but we are speaking of the average man. Defective ventilation is also a frequent cause of accident, and is found in too many mines. It is frequently the case that the workings are extended faster than the ventilating capacity, and that the supply of air falls short accordingly. The mine, in such a case, is apt to become dusty to a degree which makes it dangerous.

The whole question of dust needs further examination, and we hope that a new commission will be appointed, and will do its work thoroughly. The recommendations of the present commission are, upon the whole, sensible and practical, and should be approved by the legislature.

Steel Production.

In this JOURNAL for January 5 we estimated the production of open-hearth steel in the United States in 1904 at 5,900,000 long tons. The completed returns of the American Iron & Steel Association make the total 5,907,666 tons. This is a gain over the make in 1903 of 77,755 tons, or 1.3 per cent; open-hearth steel thus showing an increase, though there were decreases in both pig iron and bessemer steel. This result, as in previous years, demonstrates the growing extent and importance of the open-hearth steel process in American practice. Doubtless the bessemer converter will hold the first rank as long as we have an abundant supply of iron ores low in phosphorus; but the open-hearth furnace will continue to advance in use and estimation, while the converter simply holds its own. The basic converter, so largely used in Germany, has never found a place in this country.

The division of the open-hearth steel, according to processes—acid and basic—was as follows for two years past:

	1903. Tons.	1903. Per ct.	1904. Tons.	1904. Per ct.
Acid	1,094,998	18.8	801,299	13.6
Basic	4,734,913	81.2	5,106,367	86.4
Total	5,829,911	100.0	5,907,666	100.0

The basic process last year made an important advance. While the production of steel by the acid process decreased 293,699 tons, or 26.8 per cent, there was a gain in basic steel of 371,454 tons, or 7.8 per cent. Nearly seven-eighths of the open-hearth steel produced last year was made in the basic furnace.

An important incident in the production was the continued operation on a large scale of the basic open-hearth plant at Ensley, in Alabama, where steel is made from Alabama pig iron. Coupled with this last year was the manufacture of rails from basic steel, the first made in this country on a large scale. These rails have stood successfully the strictest tests on all points, except wear in service, and that can only be made by time. There is no reason to believe that they will not be equal in this respect to bessemer rails of the best quality.

As the bessemer steel output has been already ascertained, it is now possible to give the total make of steel, estimating only the small quantity of crucible and special steels. This total production is given in the table below, in long tons:

	1903. Tons.	1903. Per ct.	1904. Tons.	1904. Per ct.
Bessemer	8,592,829	59.1	7,859,140	56.6
Open-hearth	5,829,911	40.1	5,907,666	42.6
Crucible, etc.	112,238	0.8	110,000	0.8
Totals	14,534,978	100.01	3,876,806	100.0

The net result shown in this statement is that, while bessemer steel production decreased 733,689 tons, or 8.5 per cent, and crucible steel 2,238 tons, or 2.0 per cent, the open-hearth steel output increased 77,755 tons, or 1.3 per cent. The reduction in the total steel made was 658,172 tons, or 4.5 per cent. This decrease is somewhat less in proportion than that in pig iron. The ratio of steel to pig iron, which was 80.7 in 1903, was 84.1 last year.

Spelter Consumption.

According to the 'Seventeenth Annual Report' of the Lead and Zinc Mine Inspectors of Missouri, an inquiry as to the consumption of zinc in the United States showed that in 1902 about one-fourth of the entire output of ore was used for the manufacture of zinc oxide, and three-fourths for the manufacture of spelter. Of the spelter consumed, about 51 per cent was employed in galvanizing, 23 per cent in brass-making, 16 per cent in the manufacture of sheet zinc, 2 per cent for desilverizing lead, 3 per cent for the manufacture of castings, and 5 per cent for other purposes. The consumption of sheet zinc for roofing purposes was estimated at only 2,500 tons.

Statistics of consumption are always valuable, but are more difficult to compile than statistics of production. The statistics for spelter consumption, as reported above, agree well with certain previous reports on the same subject. Ingalls estimated (see 'Production and Properties of Zinc') that in 1898 the galvanizers used 52 per cent of the spelter; brass-makers, 23 per cent; rollers of sheet zinc, 19 per cent; lead desilverizers, 1.5 per cent, and miscellaneous consumers, 4.5 per cent. In 'The Mineral Industry,' Vol. VIII, it was estimated that of the consumption of spelter in 1899, about 50 per cent was employed in galvanizing, 15 per cent in brass-making, 20 per cent in the form of sheet and 15 per cent for other purposes.

Metallics.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

Zinc-blende containing iron can be separated from pyrite by the magnetic separator. Blende free from iron can be separated by the electrostatic separator.

Diamond cutting in Holland as a general thing handles the smaller gems, the larger ones being dressed in Antwerp. The cutting includes three distinct steps, namely, splitting, shaping, and polishing.

Concentrated sulphuric acid conducts electricity to only a slight degree; but it becomes an excellent electrolyte on dilution.

Cincinnati is using nearly 6,000 4-amp. alternating-current arc-lights, which seem to give fair satisfaction. But a 5-amp. or a 5.5-amp. light is better.

Pyrite is the chief fuel in pyrite smelting; but coke 4%, or less, is an attendant. Ordinary blast-furnace practice in matte-making calls for 10% coke.

There are three stages and processes in pyrite smelting, namely: (1) The heat-making, caused partly by the burning of the sulphur, but more by that of the iron; perhaps this is also aided by the energy from the molecular in-fall of silica and iron oxide; (2) the slag-making; (3) the matte-making.

Action at a distance remains an ultimate fact, independent of explanation by the principles of shock or the pressure of bodies in immediate contact. This fact—the fact of gravitation—is the foundation of the most magnificent theoretical structure in all science.

The fact that copper salts, in exceedingly small amounts, are poisonous to vegetable life has led to their employment to rid water of living or growing organisms of all kinds, from algae to the microscopic disease germ. If the quantity used is sufficiently minute, the process may be used without danger for the purification or disinfection of drinking-water. But just precisely what, or how little, constitutes this safe proportion is a matter concerning which there is not yet a unanimity of opinion.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

THE IODIMETRIC DETERMINATION OF COPPER.

The Editor:

Sir—In your issue of December 29 I read with great interest a letter by Mr. Thorn Smith, in which he expresses a wish that chemists who have had to make a trial of the iodimetric method in practice, would give their experience of it. I have had occasion to use this method almost constantly for the past two years, and must say that it has proved a perfectly satisfactory one in every way. While my experience has been mostly with low-grade ores, on such occasions as I had to assay high-grade ores, I found that the results obtained were equally satisfactory, and checked closely with those obtained by the electrolytic assay. The method I have used has been, in all essentials, that described in Furman's 'Assaying' and in the appendix of Mr. W. L. Brown's work.

I quite agree with Mr. Smith's remarks on the accuracy of the electrolytic method, and the comparative ease with which it may be performed, and I am willing to admit that the iodide method presents certain difficulties of manipulation; but once these have been mastered, it may be performed in a much shorter time than the electrolytic assay, with equal accuracy, with less trouble as regards interfering elements, and without a preliminary outlay of a considerable sum of money for costly platinum ware. The end point of the iodide reaction is much sharper than that in the cyanide method, and much more uniform results are obtainable, while as regards time, a carefully performed cyanide assay is as long a process as one by the iodide.

Mr. Thorn Smith states that it is impossible to precipitate copper completely from a solution by means of aluminum foil. I do not agree with him on this point, for I have always found that if the solution is fairly concentrated, and if it is boiled for a few minutes after it has become deodorized, the filtrate from the copper will give no indications of the presence of that element, on testing with hydrogen sulphide or other reagents.

There are, as far as I know, three methods in use for the purpose of converting the precipitated copper, dissolved in nitric acid, to copper acetate. (1) By neutralizing with sodium carbonate, and adding acetic acid. (2) By neutralizing with ammonia, and adding acetic acid. (3) By addition of a saturated solution of zinc acetate. The last is the most rapid of the three, and gives the most uniform result. The first is to be condemned on account of the danger of loss from effervescence on adding an alkaline carbonate to an acid solution and the time lost in cooling the solution. Provided that the whole of the copper in solution has been brought down and then re-dissolved in nitric acid, the main sources of error to be guarded against during the remainder of the process, are the failure of the operator to completely get rid of the excess of nitric acid, the slightest trace of which is sufficient to liberate iodine, on the addition of the potassium iodide; and to have the acetate solution quite cold before this addition. I think that if the operator would keep in mind the extreme sensibility of potassium iodide in solution to such influences as nitric acid and heat, good results could be obtained with but little difficulty.

W. N. MUSGRAVE.

Victoria, B. C., Feb. 20, 1905.

CHLORINATION VERSUS CYANIDATION.

The Editor:

Sir—In his letter in your issue of February 16 Mr. Argall ventures that there is no such process as electro-chlorination. By electro-chlorination is generally meant the direct application of electrolytic chlorine to the reduction of ores without the intervention of a secondary medium, such as bleaching powder. The mere play of words, as to the definition, does not matter. Mr. Argall does not seem to grasp the idea that the direct application of electrolytic chlorine eliminates from chlorination its greatest item of expense, namely, the cost of chemicals. It has been realized, for years, that if electrolytic chlorine could be successfully applied to the treatment of ores, a great saving could be effected, so that the cost of chlorination would be enormously reduced and could compete with cyanide, even on the basis of economy. I can positively say that this problem has been solved. I will now supply these figures, based more or less on the detailed costs of one cyanide and two chlorination mills. It is realized that these figures may vary with different mills. The comparison will be made on the basis of electro-chlorination.

	Electro Chlorination.	Cyanidation
Sampling (including coarse crushing).	$0.30	$0.30
Fine crushing: chlorination 12-mesh; cyanidation 30-mesh	0.35	0.65
Roasting	0.45	0.50
Repairs	0.25	0.25
Supplies (not including chemicals)	0.25	0.25
General labor	0.05	0.05
Concentrating	0.10	0.10
Superintendence, mill office expenses, assaying	0.15	0.15
Chemicals: chlorination, salt 10 lb.; cyanidation 1½ lb. cyanide and alkaline wash	0.05	0.40
Chemical treatment: including 10 cents for generating chlorine by electrolysis	0.35	0.25
Precipitation, refining, etc.	0.09	0.08
Total for metallurgical treatment	$2.39	$2.98
Interest on capital 6% ($500,000)	0.20	0.20
Amortization	0.25	0.25
General administration, insurance, etc.	0.15	0.15
Total	$2.99	$3.58

If bleach and acid are used instead of salt, $0.60 will have to be added to the total given for electro-chlorination.

Concentration in cyanidation (if the same ore is treated with cyanide as that now treated with chlorine) will be found profitable, even if the time of treatment is prolonged beyond the usual economic limit. The tailing from some of the cyanide mills was passed over riffles in the sluices. While this method of catching additional value is less expensive than tables, it is not as efficient. Objection may also be made to supplies and repairs being the same; nevertheless, while it is admitted that the repairs are more in the chlorinating department of a chlorination mill, this is fully counterbalanced in the crushing department of a cyanide plant. The general administration, insurance, interest, amortization, etc., may be assumed as the same for both processes. A reduction of at least 60c. in the chemicals (with the possibility of revenue from the by-products of electrolysis in generating the chlorine), and an extraction of from 96% to 98%, is the program the cyanide mills will have to compete against in the near future.

Regarding the 'mill combine,' a mining engineer in the Cripple Creek district, who was familiar with the operation and costs of one cyanide mill, now defunct, informed me that "they had to pay for 95% of the gold in the ore to get business in competition with the smelters and chlorination mills, and they could recover only from 85% to 88% in bullion. That was the principal reason they were obliged to go out of business." And, I dare say, this very aptly sums up the entire situation.

Taking now Mr. Argall's statement as to the sliming of the sand, we find a similar fragment for comparison. No mention is made as to the fineness before it is delivered to the grinders, nor is there a hint given as to the relative difficulty in sliming Kalgoorlie and Cripple Creek ore. If an intelligent comparison is to be made, it must be made on a distribution of value, as in the following mesh-determination, in chlorinating Cripple Creek ore, which is typical of many others.

SAMPLE NO. 1.

Ore Remaining	% of value.
On 8 mesh screen	0.6
" 12 " "	14.6
" 20 " "	13.2
" 30 " "	19.2
" 40 " "	12.0
" 60 " "	9.6
" 80 " "	6.0
" 100 " "	4.8
through 100 " "	20.4

SAMPLE NO. 2.

Ore Remaining	% of value.
On 8 mesh screen	9.2
" 12 " "	24.8
" 20 " "	9.6
" 30 " "	11.2
" 40 " "	9.5
" 60 " "	10.7
" 80 " "	5.0
" 100 " "	2.8
through 100 " "	17.1

It is worthy of note, that while Mr. James[1] gives the total cost of the metallurgical treatment in detail, he simply mentions the total cost peculiar to each company, which includes all extraneous items. This con-

[1] This JOURNAL, Jan. 5, 1905.

firms my own views criticized by Mr. Argall. It makes a vast difference in the cost of a mill whether it is erected in Colorado City, Cripple Creek, Australia or the wilds of Africa. This item is not directly comparable, and varies with every installation. The cost of the same treatment varies also, for that matter, but not to the same extent.

In order not to be thought guilty of misquoting Professor Christy, by inadvertence, I will add that what I should have said is: Professor Christy has demonstrated that the iron in such fine grinding is detrimental to cyanide. The idea I wished to convey was that, aside from the mere expense of such primitive and inefficient machines, as some of those maintained by Mr. Argall in the treatment of large quantities of ore, there are other difficulties which must be considered. What Professor Christy says is: "I ground the concentrates in an ordinary amalgamating pan (Mr. Argall suggests a Wheeler pan) as one would do with silver ore; and on getting it fine enough, if I used cyanide enough, I got a good extraction of the gold; but the destruction of the cyanide was so high that, until I made the discovery of the cause of it, I did not see any way of making the extraction practicable," etc. This again further confirms my views that much depends upon the material to be ground, and that Cripple Creek ore is not adapted to such treatment, except at a prohibitive cost. The Wheeler pans used at Kalgoorlie are being superseded, in the later plants, by flint-mills; and the flint-mills, judging from the one tried several years ago, do not give satisfactory results on Cripple Creek ore.

W. E. GREENAWALT.

Denver, Colo., February 24, 1905.

[The discussion is now closed.—EDITOR.]

INTERNATIONAL WEIGHTS AND MEASURES.

The Editor:

Sir—Will you allow me to call attention to a number of errors in Dr. Seaman's letter in your issue of February 9? Let us examine his propositions in their order:

1. There is no disagreement on this point. The advantage of one standard for weights and measures is conceded by all. Which one? That is the question.

2. This statement also, that there has been a trend toward unification, is not questioned; but the tendency has been obstructed by the mistakes of law-makers in their efforts to bring about uniformity. The greatest of these mistakes was the establishment of the metric system on a basis incommensurable with the English system. If the meter had been made an even number of English inches (40, 100 or 120, for example), the British and metric systems could have been used side by side without difficulty. It may not be too late to do this now. Certainly such a proposition is more reasonable than that of changing the only system (the British) that forms a single standard for any country on earth. The incommensurability of the English and metric units is the obstacle to a single standard. Without the metric system the world would have been much nearer to uniformity of weights and measures. It has increased the confusion by adding standards where there are already too many.

4. Instead of being formed by "accidental selection," as Dr. Seaman asserts, the British system was formed by a process of natural selection, which accounts for the remarkable adaptability of its units to the varied wants of man. The English standards originated, not from any arbitrary and theoretical division of a single unit, but from the fact that each was suited for the use to which it was applied.

5. The metric system was invented by theorists who did not know the practical requirements of weights and measures in their own time, and who could not be expected to foresee the new requirements of the future. There was not a single manufacturer, mechanic, textile worker, or merchant among them.

6. John Quincy Adams, who examined the subject at the request of Congress, reached the following conclusions regarding an exclusively decimal basis for weights and measures:

". . . It appears also not to have been considered that decimal arithmetic, although affording great facilities for the computation of numbers, is not equally well suited for the divisions of material substances. A glance of the eye is sufficient to divide material substances into successive halves, fourths, eighths and sixteenths. A slight attention will give thirds, sixths and twelfths. But divisions of the fifth and tenth parts are among the most difficult that can be performed without the aid of calculation. Among all its conveniences the decimal division has the great disadvantage of being itself divisible only by the numbers two and five. The duodecimal division, divisible by two, three, four and six, would offer so many advantages over it that, while the French theory was in contemplation, the question was discussed whether the reformation of weights and measures should not be extended to the system of arithmetic itself, and whether the number twelve should not be substituted for ten, as the term of the periodical return to the unit. . . .

"The advantages of the English system might, however, be with ease adapted to that of France, but for the exclusive application in the latter of the decimal arithmetic to all its multiples and subdivisions. The decimal numbers, applied to the French weights and measures, form one of its highest theoretic excellences. It has, however, been proved by the most decisive experience in France, that they are not adequate to the wants of man in society. . . . Thus, then, it has been proved by the test of experience that the principle of decimal divisions can be applied only with many qualifications to any general system of metrology; that its natural application is only to numbers, and that time, space, gravity and extension inflexibly reject its sway. . . .

"From the verdict of experience, therefore, it is doubtful whether the advantage to be obtained by any attempt to apply decimal arithmetic to weights and measures would ever compensate for the increase in diversity which is the unavoidable consequence of change. Decimal arithmetic is a contrivance of man for computing numbers, and not a property of time, space or matter. Nature has no partialities for the number ten, and the attempt to shackle her freedom with them will forever prove abortive."

7. The British system has the merits of both the decimal and duodecimal divisions. We use any division that may be found best suited to the purpose.

8, 9, 10. Dr. Seaman fills these paragraphs with prophecy, which I shall not consider, or with error, which is largely self-evident. The passage of the metric bill in the House of Lords and its first reading in the Commons are unimportant. The Government has refused to endorse the measure, and when the metricites on April 16, 1904, attempted to sneak a metric law through the House of Commons as a rider on another bill, the Government leaders refused to sanction the bill, and Sir Michael Hicks-Beach made the following statement in regard to it:

"Though there might be some theorists who wished to establish the metric system in this country, when they came to apply their theories they would find such a mass of opposition as would make their scheme impracticable."

11. The study of the metric system in our public schools is a farce. The use of the metric system for scientific investigations is conceded without impairing in the least the objections to its extension by the power of the law. The United States made the metric system permissive in this country forty years ago, and its proportionate use has not increased since that time. There can be no objection to any one using it if he wants to. What we do object to is compelling people by law to use it whether they want to or not.

12. In this paragraph Dr. Seaman makes many unproved assertions. His statement regarding the advantage of the metric system and the disadvantage of the English system in education doubtless refers to the claim of a saving of one to three years in the school life of every child. This claim is made ridiculous by the report of the New York Board of Education, dated May 27, 1903, by which it appears that of the eight years of school life only 34⅛ weeks are occupied by the study of mathematics, including algebra and geometry. Estimating the time in proportion to the space (20%) occupied in the text-book on

arithmetic, we have in the eight years by this liberal estimate just 6 and 8-10 weeks devoted to compound numbers, weights and measures. And this is the entire basis for the extravagant claims of a saving of time and money by the adoption of the metric system in our schools.

13. The "goods bought from England and the United States" comprise a very respectable factor. British and American trade has carried the English system into every part of the known world. The linear standards of Russia are English, made so by the ship carpenters brought to Russia by Peter the Great in 1698. All the world, except France, uses the English cotton standard, and France does not use the metric. The principal manufacturing countries of the world, including Germany, Austria and Spain, use the English system for assessing duties on cotton yarn and cannot change, because it is their mill standard. In the Philippines the metric system has been the official standard for fifty-five years, and is nothing more than official now. Neither the Filipino on the inside nor the rest of the world on the outside will use it for textiles, which form the bulk of the Philippine exports and imports, and so it remains a standing anomaly and an obstruction to business. The following statements by French, Italian and Belgian delegates at the Paris Congress of 1900 are typical illustrations of the way in which the world's trade is forced to conform to the English system:

M. Louis Guerin, Lille, France: "It is practically impossible for us (the French) to sell linen by any other than the English standard. . . . If the law of 1810 providing for the metric standard is enforced we shall be the first to complain of that which we have asked for."

Baron Cantoni, Milan, Italy: "It is necessary to remember that nearly all the exports of cotton yarn are from England, and we can do nothing if that country does not adopt the system we favor. . . . The difficulty will always be in exporting to uncivilized lands where the people have been accustomed for a hundred years to English measures and numbers, and where articles of cotton are frequently used as currency."

M. Boucher-Feyerick, Tournai, Belgium: "We Belgians export enormous quantities of linen yarn to England, Asia and Egypt, and we cannot adopt the metric system without risking the loss of this trade. Our customers in the countries named are familiar with the English system of numbering, and if we do not give it to them our competitors will, and we shall lose the market. I speak not alone for myself, but for all Belgian spinners. We cannot change."

14. Nothing could be farther from the facts than Dr. Seaman's reference to the confusion of 'yarn counts.' Continental Europe has 34 indigenous systems in use, based on a medley of old units, all antedating the metric system. Not one of them originated in England, as Dr. Seaman asserts. In addition to these, the English system is used, being practically the single standard for cotton and linen in Continental Europe. The only indication of uniform textile practice on the Continent is found in the general use of the English system. On the other hand, there are but four Anglo-American systems of numbering spun yarn, besides the five local English and Scotch methods. Each of these four is used for but one kind of yarn, woolen, cotton, worsted or linen, and all are based on the English yard-pound.

In view of these facts, which are duplicated in every branch of industry, we can do no better than listen to the following prophetic and statesmanlike words of John Quincy Adams in 1821:

"That neither country (Great Britain or the United States) has yet changed its law (regarding weights and measures) is, perhaps, a fortunate circumstance in reference to the principle of uniformity for both. If this report were authorized to speak to both nations, as it is required to speak to the Legislature of one of them, on a subject in which the object of pursuit is the same for both, and the interest in it common to both, it would say, Is your object *uniformity?* Then, before you change any part of your system, such as it is, compare the uniformity you must lose with the uniformity that you may gain by the alteration. At this hour fifteen millions of Britons, who in the next generation may be twenty, and ten millions of Americans who, in less time, will be as many, have the same legal system of weights and measures. Their mile, acre, yard, foot and inch; their bushel of wheat, their gallon of beer, and their gallon of wine; their pound avoirdupois and their pound troy; their cord of wood and their ton of shipping—are the same. They are of the nations of the earth the two that have with each other the most of that intercourse which requires the constant use of weights and measures. Any change whatever in the system of the one, which would not be adopted by the other, would destroy all this existing uniformity. Precious, indeed, must be that uniformity, the mere promise of which, obtained by an alteration of the law, would more than compensate for the abandonment of this."

Let the proposition to introduce the metric system by force be postponed forever.

SAMUEL S. DALE.

Boston, Mass., Feb. 15, 1905.

The rare element europium was described several years ago by Demarcay. It has recently been confirmed by Urbain and Lacombe; they obtained it from monozite sand. The atomic weight is about 151.8; its oxide is white, but its sulphate has a rose tint.

Mineral Products of the United Kingdom in 1904.

An advance proof of the tables relating to the output of mines covered both by the coal and by the metalliferous mine regulation acts, has been received. As returns from quarries are not yet available, the totals for iron ore, building stone, etc., are not complete; but the figures for coal and for copper, lead and zinc ores may be considered as substantially correct. These are:

	1903.	1904.
Coal:		
England		161,339,059
Scotland		35,453,009
Ireland		105,637
Wales		35,514,079
Total	230,324,295	232,411,784
Barytes	23,671	21,130
Bauxite	6,128	8,700
Copper ore	6,867	5,465
Fluorspar	10,697	16,889
Gypsum	176,980	195,665
Lead ore	26,355	26,371
Manganese ore	818	8,756
Pyrites	9,639	10,287
Rock salt	167,769	187,828
Tin ore, concentrated	6,499	6,000
Zinc ore	24,888	27,655

Persons employed in mines under the two categories numbered:

	1903.	1904.
Coal mines, etc.:		
Above ground	165,320	165,87
Under ground	676,746	681,683
Metal mines, etc.:		
Above ground	12,252	12,220
Under ground	17,571	17,284
Total employees	871,889	877,057

The increase in the number of workers in coal mines was 0.65%, and the increase in the output of coal was 0.91%, showing an improved efficiency in labor.

The Calorific Power and the Flame Temperature of Gases.

London *Engineering* publishes some results of Mahler's and Thomsen's investigations as to the combustion of certain liquids and gases that are used for fuels, from which we abstract the following values, in calories per kilogram and centigrade degrees, respectively:

	Calorific power.	Flame temperature.
Alcohol, methyl	5,307	1,700
Alcohol, ethyl	7,054	1,700
Alcohol, amyl	9,018	1,850
Petroleum, crude	10,400	2,000
Petroleum, refined	10,280	1,660
Hydrogen	34,180	1,960
Carbon monoxide	2,442	2,100
Methane	13,345	1,850
Acetylene	11,945	2,350
Illuminating gas	.....	1,950
Water gas, industrial	.....	2,000

The figures given for calorific power represent gross values; that is, they include the heat liberated by condensation of any water vapor that may be generated by combustion. The proportion of the gross heat that is due to this source is in direct ratio to the hydrogen contents of the fuel, and ranges from 15.8% in the case of pure hydrogen and 12% for water gas, down to 3.5% for acetylene. In the determination of flame temperature, the material was burned with the least necessary quantity of air.

Zinc silicate is reducible by carbon.

Mining Stocks.

(Full quotations on pages 535 and 536.)

New York. March 15.

A healthier appearance suggests public confidence in continued expansion in the stock market. Not a few of the better class of securities have made high records for the year. Amalgamated Copper has touched $81.625, on expectation that the next quarterly dividend would be increased. Anaconda went to $30.75. Greene Consolidated Copper was exchanged at $28 @$29.125, and Greene Gold at $8.125@ $8.50. Tennessee Copper was dealt in quietly at $29.75@$30.25. A sale of Heinze's United was reported at $8.25. Some interest was shown on curb in Guanajuato Consolidated, of Mexico, which opened at $4.625 and touched par, $5.

Ontario Silver, of Utah, came forward at $3.75, and a sale of Standard Consolidated Gold, of California, was made at $2, an improvement from previous transactions. Homestake, of South Dakota, recently quoted at $76, has resumed its 50c. monthly double dividend. Portland, of Cripple Creek, Colo., was 'matched' at $1.95, and Alice, of Montana, gaining in favor rose to $1.25. The Comstock shares were rather quiet. Some business has been done in the new Nevada stocks, the majority of which are quoted on the San Francisco exchange.

Evidently the industrial combinations are facing better prospects in the speculative arena. American Smelting & Refining common on large sales advanced from $94.625 to $99.375, and the preferred from $120.75@$123.75. Federal Mining & Smelting common took the lead at $114, while the preferred high mark was $95.75. United States Reduction was ushered in after a long absence, the common stock selling up to $28.50, and the preferred at $55.125.

Boston. March 14.

There has been a great improvement in this market the past week, and it almost seemed like bygone days to see the way certain stocks jumped. Under Lawson tuition, Copper Range Consolidated has been doing great "stunts," and has been foremost in the movement. Monday over 26,900 shares were traded in, and to-day 23,600 shares changed hands. The action of the directors in declaring the initial quarterly dividend of $1 per share was expected. Friday of last week it made a $2.75 advance, which was followed by another $4.25 advance. Monday it rose $1.50, and to-day $1.50, touching $83, and closing at $81.75, against $72 a week back. A great deal of the trading, no doubt, was artificial, but it was the means of giving the market a good start. Osceola also made a good record by advancing $9.50 per share, to $103, closing $4 below this. Tamarack also gave a good account of itself, moving up $11.50, to $140, and retaining all but $5 of it. Both stocks move up $1 at a time, and it is an easy matter to mark them up. There was no special news to account for the movement in either of them.

Centennial mining directors levied a $4 assessment last Thursday, payable $2 on April 10 and $2 on Aug. 9.

United States has been very active, second to Copper Range, and touched $27.50, closing at $27, against $24.87½ a week ago. The company is to add another blast furnace to its smelter, making seven. New York interests are responsible for a great deal of the activity. Atlantic spurted almost $3, to $18.75, reacting $1. A part of the buying came from the Lake district. Allouez has not done so well, although it rose $1.25, to $24.

Quincy touched $112. The report was well received, as was that of the Atlantic. Calumet & Hecla is up $13, to $683, while Wolverine closes firm at $119. Utah is a fraction better for the week, at $41. Greene has been active, touching $29.87½. Mohawk touched $56.25; Michigan, $15.75; Old Dominion, $28; Winona, $15. Isle Royale rose $3.50, to $28.50, losing $1.12½. Guanajuato rose to $4.87½ on active trading. Trinity, which sold up $2.50, to $13, lost $1 of it. It is announced that the Tecumseh mine will begin drilling on the Kearsarge lode as soon as weather conditions permit.

A local banking house has purchased $200,000 Majestic Mining Company bonds, and F. A. Schirmer has gone on the board.

Colorado Springs. March 10.

The market in Cripple Creek shares on the local exchange has been quite active during the past week, but with a tendency to lower prices in a number of stocks. There were no features of special importance. On the report of an unusually good strike on the Gold Dollar Consolidated, this stock was especially active, and advanced from 9⅞ to 11c. El Paso reached $2.00½. Cripple Creek Consolidated will pay a dividend of ½c. per share, amounting to $10,000, on March 25. Acacia sold for 10¾, being a fraction below last week's quotation. Anaconda declined nearly 4c., to 14¾c.; C., K. & N. sold for 18½c.; Elkton sold down to 61 on to-day's call.

Salt Lake City. March 10.

Among the happenings of the past week which interested mining stock circles was the announcement of the return of Daly-West to the dividend column. This, however, was expected, as officials of the company some time ago made it known that quarterly, instead of monthly, payments would be inaugurated early in the present year. This promise has been fulfilled, and $108,000, or 60c. a share, will be distributed among shareholders March 15. Since the declaration the stock, while in little demand, held its own fairly well. But New York Bonanza, of Park City; Butler-Liberal, Silver Shield, of Bingham; Uncle Sam and Little Chief, of the Tintic districts, were the chief attractions of the week. New York fluctuated considerably, and after falling to 44¾c., regained its strength. Uncle Sam stiffened during the previous week through the active demand for it, in which, although it was not generally known, officials of the company did some buying; as soon as they let up the stock, having lost its support, weakened. May Day has remained steady, and Tetro, Star Consolidated and Yankee Consolidated stocks have strengthened.

San Francisco. March 9.

The market for the Comstocks has been slightly dull, owing to the absence of buying orders, and closes with a weaker tendency. Ophir is quoted at the close at $7.25; Mexican, $1.95; Consolidated California & Virginia, $1.85; Hale & Norcross, $1.30; Best & Belcher, $1.05; Sierra Nevada, 51c.; Gould & Curry, 28c. per share.

On the San Francisco & Tonopah exchange business was good and prices fairly steady. Montana Tonopah sold at $2.95@ $3; Goldfield, 79c.; Sandstone, 79c.; Tonopah North Star, 50c.; MacNamara, 45c.; Black Butte, 44c. per share.

On the California exchange dealing in oil stocks was rather slow, and there was not much inquiry for shares. Twenty-eight was offered at $10; Reed Crude, $2.20; Clairmont, 70c.; Home, 44c. per share.

Monterey. March 7.

Exchange on New York remains at 202.

In mining stocks, Victoria brought $69; Aldebaran, $15; Dos Estrellas, $3,460; Augustias, $56; Providencia, $156; Roma, San Felipe, Guanajuato, $12; La Paz, San Luis Potosi, $290; San Felipe de Jesus, Pachuca, $12; Amistad y Concordia, $70; Santa Gertrudis, $75; Sorpresa, $310, and Soledad, $1,250.

Coal Trade Review.

NEW YORK, March 15.

ANTHRACITE.

The hard coal trade is more brisk than would naturally be expected at this time, while the summer discount is only two weeks ahead. Mines are all working at full capacity, and difficulties in the way of transportation are all eliminated.

The smaller steam sizes show a sharp decline in price, and are being sold in close competition with bituminous at whatever price they will bring. This applies more particularly to coal, whose small sizes are not the best adapted to steam purposes, and which has already been stocked. Domestic and the coarser steam sizes remain at the same level: $4.75 for broken, and $5 for egg. Steam sizes are quoted at $3 for pea, $2.25@$2.50 for buckwheat, f. o. b. harbor shipping points.

BITUMINOUS.

The Atlantic seaboard soft coal trade continues strong. The amount of coal arriving at tidewater points is short of demand, and prices have accordingly advanced, particularly on spot coal, and now range around $2.80@$2.85. This shortage in supply seems to result from lack of cars.

Recent advices state that the Norfolk & Western and the Chesapeake & Ohio are to continue their last year's through rate of $1.35 to Norfolk and Newport News, as against the $1.50 rate of the Pennsylvania to New York harbor, involving a haul of 100 miles less than that of these other two mentioned roads. Some producers state that the rates from Virginia ports to around the Capes have not been definitely settled.

Contracts for the coming season are being closed regularly and quietly, and considerable tonnage has already been taken. Rates seem to be adjusted on a basis of $1.15@$1.20 at the mines for ordinary steam grades. Probably the insistence upon the high prevailing prices keeps the contract market from being more active than it is.

Ice conditions in New York harbor are practically removed, and Delaware and Chesapeake bays are open to traffic. Trade in the far East is active. Orders from that territory appear to have accumulated, and shippers are now attending to them as fast as pressure of other business will permit. Trade along the Sound is quieter than it has been or has been expected to be. New York harbor shows a demand larger than the supply, current quotations being $2.80@$2.85, f. o. b. shipping points.

All-rail trade continues to be vigorous, and the prices remain strong. Transportation from mines to tide is good, and shippers report that they are receiving about one-half of their requisition for

cars. In the coastwise vessel market a good supply of boats seems to be available. Philadelphia quotes for large vessels as follows: To Boston, Salem and Portland, 75c.; to Lynn and Newburyport, 90c.; to Saco, Gardner and Bangor, $1; to Sound ports, 60c.; to Portsmouth, 80c., in addition to the usual towages wherever these are necessary. These rates are thought to apply also for Norfolk and Newport News.

Birmingham. March 13.

There is a strong demand for coal in Alabama with the production only fairly good. At the mines where the union miners are out on strike there is very little improvement over conditions which have prevailed for the last two months. No coal is yet being mined at Sumter or Virginia, the fire in the first named still being on, while the water is being pumped out of the other preparatory to removing all the bodies of victims of the explosion from the lower portion of the slope. These two mines produced nearly 1,800 tons a day. At the commercial coal mines, where there is no strike or other trouble, the operation is steady and the production is holding its own.

State Mine Inspector J. M. Gray and his two assistants commenced their investigation into the cause of the explosion in the Virginia mine, A. W. Reed & Co., lessees, Alabama Steel & Wire Company, owners, on February 20. The investigation will continue at least a fortnight. The bank bosses of the mine have been examined already. State Mine Inspector Gray announces that no information of an official nature will be given out until the report has been completed and forwarded to the Governor of the State. That there was dust in the mine is not denied. A statement that there was an accumulation of gas bratticed off in several of the rooms in the mine is now denied officially. The mine was equipped with two openings, the regular slope and the manway.

The following official figures are given as to the coal production in Alabama during the year 1904: Total production, 11,273,151 tons. Production by counties: Bibb county, 1,369,575; Blount, 59,132; Cullman, 142,218; DeKalb, 35,514; Etowah, 182,649; Jackson, 14,295; Jefferson, 5,834,490; Marion, 71,352; Shelby, 111,476; St. Clair, 154,813; Tuskaloosa, 662,929; Walker, 2,512,337; Winston, 42,371. The production in 1903 amounted to 11,700,753 tons. The official report will be issued this week.

Chicago. March 13.

For both anthracite and bituminous the market is weak, with no prospects of strength for the rest of March. Retailers' sales have been low on account of mild weather, and they are following the needs of customers closely. The anthracite business has become one of small and scattered lots, which condition is normal for the season. There is much anthracite coming forward now that was delayed in transit—so much, indeed, that the price has been cut 25c.@50c. on egg and stove. Dealers are complaining generally of the cancellation of orders for anthracite, which is due chiefly to the rush for coal a month ago, when the coldest weather of the winter made it necessary for retailers with short supplies to get coal wherever they could. Now that the coal has come forward and is ready for prompt shipment, nobody wants it. In April, it is expected, the usual 50c. discount will be made, followed by a rise of 10c. per month in price until the full circular price is reached September 1, and sales are already being made for delivery at the April price.

The chronic weakness of the bituminous market seems to be due to the shipment of too much of the product of Indiana and Illinois mines to Chicago. This condition has existed since the great stimulus given to the mining of bituminous by the anthracite strike in 1892. Hocking is 10@15c. below the standard price of $3, and will drop probably in circular price slightly after April 1. Smokeless sells at $3@$3.10, and, like Hocking, is in danger of oversupply from the increased receipts due to milder weather. Youghiogheny is in fair demand, and brings $2.90@$3. Domestic grades of all bituminous coals are weak.

Cleveland. March 13.

The trade in this territory has shown some signs of improvement. Added to the prospects of heavier consumption in steam coal there is the immediate possibility that coal will begin to move up the lakes within the next few weeks. Some of the railroads, believing in the possibility of an early opening of navigation, are beginning to move coal to the lakes. The only influence this has had on prices is to stiffen them, without causing any advance. Prices rule at $1 at mine, in both the Ohio and the Pennsylvania field. The lake possibilities, however, offer a freer supply of slack shortly, and that has a tendency to weaken the market. Pennsylvania slack is selling at 70@75c. at the mines, while the Ohio product is bringing about 5c. a ton less.

The trade in domestic coal has lessened materially, but the market has not broken. Prices continue to be based on $2.30 at mine for general selected lump.

The coke trade is a little stronger. The ovens have not been able to fully catch up with the orders, upon which they fell behind some time ago. Most of the furnaces and many of the foundries are running hand to mouth as to supply. Standard 72-hour coke is selling at $3 at the oven, and foundry coke selling at $2.50@$2.60 at the oven.

Pittsburg. March 14.

Coal.—The rivers are navigable and about 6,000,000 bush. of coal in coal boats and barges is on the way to Southern ports. The coal-boat stage is over for the present, but a barge stage exists and fully 1,000,000 bush. will be shipped in barges to-day and to-morrow. Another good boating stage is expected in a short time. The capacity of a coal boat is 25,000 bush., and a barge holds about 13,000 bush. Nearly all the mines in the Pittsburg district are in full operation, the present railroad car supply being up to requirements. Prices are about the same, run-of-mine coal still being quoted at $1@$1.10 at the mine, while slack is selling at 75c.

Connellsville Coke.—There was a big increase in shipments last week, due to an improved supply of railroad cars, greatly reducing the surplus stocks, which are said to have amounted to fully 250,000 tons. Less than 1,000 ovens in the region are idle, out of the total number of 22,703. Prices are firm at $2@$2.25 for furnace and $2.75@$3 for foundry coke. The production for the week is given at 261,228 tons, and the shipments were 11,886 cars, distributed as follows: To Pittsburg and river points, 4,568 cars; to points west of Pittsburg, 5,988 cars; to points east of Everson, 1,330 cars. This was a gain of 561 cars over the previous week.

San Francisco. March 9.

The coal market continues quiet but steady.

For Pacific Coast coals, in large lots to dealers, prices are: New Wellington, Richmond and Wellington, $8; Roslyn, $7; Seattle and Bryant, $6.50; Beaver Hill and Coos Bay, $5.50; white ash, $5.25. Rocky Mountain coals, in car lots, are quoted as follows: Colorado anthracite, $14; Castle Gate, Clear Creek, Rock Springs and Sunny Side, $8.50. Eastern coals are as follows, ex-ship: Pennsylvania anthracite, $14; Cumberland, $13. Both are in light supply. For foreign coal, ex-ship, prices are: Welsh anthracite, $13; cannel, $8.50; Wallsend and Brymbo, $7.50 per ton.

Foreign Coal Trade.

March 15.

Imports of fuel into Germany in the month of January are reported as follows, in metric tons:

	1904.	1905.	Changes.
Coal	390,021	583,089	I. 193 068
Brown coal	526,882	680,153	I. 153,271
Coke	41,255	65,534	I. 24,279
Totals	958,158	1,328,776	I. 370,618

The chief imports of coal were from Great Britain; of brown coal, or lignite, from Austria.

Exports of fuel from Germany in January are reported as follows, in metric tons:

	1904.	1905.	Changes.
Coal	1,572,570	1,322,584	D. 249,986
Brown coal	1,658	1,357	D. 300
Coke	208,132	200,827	D. 7,305
Totals	1,782,360	1,524,768	D. 257,592

Exports of coal were chiefly to Austria, Holland and Belgium; of coke to France. There were 1,578 tons of coke sent to the United States this year.

The coal production of Germany in January is reported as below, in metric tons:

	1904.	1905.	Changes.
Coal	9,969,763	7,590,980	D. 2,378,783
Brown coal	4,152,768	4,462,998	I. 310,230
Total mined	14,122,531	12,053,978	D. 2,068,553
Coke made	987,980	780,761	D. 207,219
Briquettes "	945,224	957,592	I. 12,368

The decrease in production this year was due to the strike of the coal miners. This did not affect the lignite, or brown coal, mines.

We have heretofore given the production of the Nord and Pas-de-Calais, the chief coal mining districts in France. The output of several other districts for 1904 is given below, in metric tons:

	Coal.	Coke.	Briquettes
Loire	3,528,975	80,871	213,450
Gard	1,907,737	45,946	308,731
Herault	238,881	3,359	44,780
Totals	5,675,593	130,176	566,961

The important mines in the Loire are Firminy, Montrambert and St. Etienne; in the Gard, those of Grand Combe and Beueges.

Iron Trade Review.

NEW YORK, March 15.

The iron markets continue generally strong and active, though just at present buying is confined chiefly to material for the second half of the year. Pig iron prices are somewhat firmer for future deliveries, owing to the demand. One or two blast furnaces in the Pittsburg district are out, on account of various accidents, and it is quite possible that the United States Steel Corporation may soon

be in the market again for iron from the outside stacks. There is talk in the Mahoning and Shenango valleys of a strike of the blast furnace workers for the three-turn system. This can hardly be granted, and will probably result in a compromise.

Orders continue to come in for second-half business, but the steel mills are not generally disturbing themselves, as they have abundant work on hand, and most of them have all that they can do to fill their present orders. Plates are in strong demand, and business in structural steel is improving, though not yet fully up to the mark that was expected. There is an active call for steel billets and sheet bars; early deliveries are impossible, and premiums are being paid for material that is wanted soon. The only weak point continues to be the rail market, where orders from the roads come in very slowly. At the present time the rail mills have contracts for about 1,400,000 tons, which is not over one-half their capacity.

Upon the whole, the iron and steel markets are in very good condition, and the prospect continues fair for active business throughout the year.

Birmingham. March 13.

Numerous sales of pig iron have been made, and one company has already notified selling agents to stop booking business for second-quarter delivery. A quantity of iron has been sold for delivery during the third quarter of the year and Alabama iron makers have inquiries in hand for iron to be delivered the last part of 1905. It is estimated that not more than 35,000 tons of iron could be found on the furnace yards in the Birmingham district which has not been sold, and the production is not near the amount being shipped out.

Local consumption is healthy.

During the past week some good sales were made. The production in February was short on account of the bad weather in this section. The statement that a brokerage firm had been selling iron at $1 per ton under the price at which it was purchased, the purpose being to establish a new quotation, was commented on and in some circles denied.

With the exception of coal and coke, the raw material supplies in Alabama are satisfactory. Preparations are being made to increase the coal and coke supplies. There is no iron being purchased in this district for speculative purposes. Furnacemen state that the purchasers are people actually needing the product. Cast iron pipe makers, machinery makers, foundries and machine shops, stove foundries and other plants employing pig iron in their daily operation have contracts on hand which will call for much iron.

The following quotations for pig iron are given: No. 1 foundry, $14@$14.50; No. 2 foundry, $13.75@$14; No. 3 foundry, $13.25@$13.50; No. 4 foundry, $12.50@$13; gray forge, $12@$12.50; No. 1 soft, $14@$14.25; No. 2 soft, $13.75@$14.

The plant of the Alabama Steel & Wire Co., at Gadsden, is not making iron. The plant of the Tennessee Coal, Iron & Railroad Co., at Ensley, is busy. The company has made provision for the greater portion of the probable make for this year. What is not going into rails is being worked in the Bessemer rolling mill, which is the property of the same company. A new engine and a roughing mill has just been added to the mill.

The Gate City rolling mills, of the Republic Co., the Sheffield rolling mills, and the Anniston mills connected with the car works are in operation, giving employment to members of the Amalgamated Association of Iron & Steel Workers. The Bessemer mills do not employ Amalgamated Association members yet.

Chicago. March 13.

The iron market continues to hold its own, and perhaps to advance a little, though the change is not pronounced. There is certainly no falling back. Inquiries continue to be numerous, and actual sales rather light. Most of the consumers of pig iron wish to make contracts for the last half of the year, but sales are as yet confined to the second quarter, speaking generally. The week's business has been in small lots, as regards actual sales, though several large contracts are reported pending. Prices of pig iron hold firm at $13.50, Birmingham, or $17.15, Chicago, for Southern No. 2, and $17.50 for Northern.

Southern agents are apparently confident that the present prices will hold, if they are not advanced, and report that in some cases $14 Birmingham has been obtained for deliveries in the second and third quarters of the year. The general condition of business for the foundry men is good, and there seems no reason why the expectations of sellers should not be realized.

In finished products there is activity everywhere, and general indications promise a substantial and a prosperous year for every branch of the iron industry. Structural material is especially in demand, and railroad supplies are selling heavily. Plates are in heavy demand, as are also sheets and merchant steel. Confidence in general prosperity for the rest of the year 1905 is expressed in all lines of the iron and steel industries.

Coke is firm, with no surplus on track and no scarcity, with Connellsville 72-hour selling at $5.50@$5.65, with standard coke 25@50c. lower.

Cleveland. March 13.

Iron Ore.—The reports are now that the movement of ore down the lakes will begin about April 1. The vessel owners hope in a few days to have freed themselves from all entanglements with the labor situation, and to have all their difficulties out of the way in time for the opening of navigation. Some are making plans for a prolonged fight, however, due to the stand of the pilots, who are asking recognition, which the vessel men do not want to agree to. Chartering on the rates as made has been rather free, and a good part of the tonnage which will be moved on contract has already been covered. The rates are 75c. from Duluth; 70c. from Marquette and 60c. from Escanaba. There is still a little buying of ore at the old prices of $3.75 for bessemer old range; $3.50 for bessemer Mesabi; $3.25 for non-bessemer old range, and $3 for non-bessemer Mesabi.

Pig Iron.—The strongest point in the pig iron market continues to be the trading in basic. Some buyers want to contract on current prices, fearing a rise. The furnaces are still refusing to sell further ahead than 60 days, and are holding firmly now for $15.50 in the Valleys, with one or two of them asking $16 in the Valleys. In the foundry trade, the only signs of activity are seen in the increased tendency of the buyers to cover their needs for the second half of the year. The price has not changed from $16 for No. 2 in the Valleys. There is a good demand in this territory for bessemer from the smaller buyers, but no big transactions are reported. The price holds at $15.50, with a few lots going as high as $16 in the Valleys.

Finished Material.—Deliveries give the mills more concern than new business, since they have all they can handle. This is especially true in the structural and plate trades, with a condition approaching that in sheets. The only exception to this general rule is found in bars.

New York. March 15.

The demand for pig iron continues good, especially in small lots. Many foundries here and in New England are buying in moderate quantities to fill their requirements. We hear of quite a number of re-sales, indicating that some earlier purchases may have been of the speculative order.

There is no material change in prices. For Northern iron we quote as follows for large lots: No. 1 X foundry, $17.75@$18; No. 2 X, $17.50@$17.75; No. 2 plain, $16.75@$17; gray forge, $16@$16.25. Some Virginia foundry No. 2 has been sold at $17.65@$17.90, while Virginia basic brings $17.15@$17.65. Southern iron is firmly held, and we quote for large lots on dock as follows: No. 1 foundry, $17.75@$18; No. 2, $17.25@$17.50; No. 3, $16.75@$17; No. 4, $16.25@$16.50; No. 1 soft, $17.75@$18; No. 2 soft, $17.25@$17.50; gray forge, $16.25@$16.50.

Business in pig iron warrants on the Produce Exchange has been a little better, but is still only fair. The latest quotations range $16.60 bid and $16.90 asked for March, April and May delivery; $16.70 bid and $17 asked for June iron.

Bars.—Bar iron is 1.745c.@1.845c. for large lots at tidewater. Steel bars are quoted at 1.645@1.745c. Store trade is steady at 2@2.25c. base.

Plates.—Plates are in good demand. Tank plates are 1.745@1.845c., New York delivery; boiler plates, 1.845@1.945. Extra charges are made for extra widths.

Structural Material.—Business still promises well. Beams and channels up to 15 in. are now 1.745c. for large lots; over 15 in., 1.845c. Angles are 1.745c. for large orders.

Steel Rails.—The regular quotation continues $28 per ton at mill for standard sections. Very little business is done in this market. Light rails continue in fair demand, prices varying from $23 for 35-lb. sections up to $28 for 12-lb. rails.

Old Material.—Scrap of all kinds is in good demand, and prices are firm. Old steel rails are still called for. Railroad wrought is quoted $20@$21; best yard wrought, $17@$18; heavy steel melting scrap, $16@$17; machinery cast, $14@$15. These prices are on cars, Jersey City or other terminal delivery.

Philadelphia. March 15.

Pig Iron.—Scarcely any change has taken place in crude iron, and prices hold their own. There is more inquiry for foundry, but more selling of forge. Consumers of basic are pretty well supplied for the present, and are not disposed to extend their engagements until the market develops something new. Our local foundry people have bought in a small way within a week, and a number of transactions are likely to be closed before Saturday. Purchases have been made of Virginia irons, as some of the Virginia furnaces are in better shape with reference to early deliveries. Very few of our Pennsylvania furnaces are in a position to deliver iron with any degree of promptness. The situation is quite satisfactory.

Prices, of course, are strong, and quotations are given at $18.25 for No. 1; $17.75 for No. 2 X; $17.25 for No. 2 plain; $16.50 for forge; basic is nominally $17, and low phosphorus is nominally $20.50.

Billets.—More billets are wanted than buyers can readily contract for. The conviction prevails in this market that billets are liable to advance, especially for delivery within 60 days; for summer delivery better terms can be had, but manufacturers are less inclined this week than two weeks ago to talk about remote deliveries. Business has been done on a basis of $29 on this market, which is regarded as a low price for early delivery.

Merchant Bar.—The bar iron trade is very active at the stores especially; the breaking up for the winter has allowed a good many requirements to show themselves, and it transpires that the small users of bars worked up about all the stock they had on hand, and they are now eager buyers. Refined bars are quoted at 1.80, and steel bars at 1.68½c.; our mills are on full time, and the outlook is for continued activity.

Sheets.—The sheet makers report that prices are high and firm, and for early deliveries premiums are readily paid. There is special inquiry for galvanized, and thin sheets are also wanted for delivery in 30 days.

Pipes and Tubes.—The demand for pipe is quiet just at present, but for tubes there is an understanding between buyers and makers, which leads to a good deal of business.

Merchant Steel.—There is a steady consumption of all kinds of merchant steel. The tone of the market is very strong.

Plates.—The extraordinary activity among railroad people for iron and steel plate for car work is leading to a congested condition at some mills. Several large contracts have been placed within the past week. Some of the plates are unusually heavy. Tank plate is also under better inquiry than since the opening of the year. Quotations for tank in small lots, 1.78½; fire-box steel, 2.28½, and flange steel, 1.88½c.

Structural Material.—Large orders are being placed. Railway bridge steel will be wanted for summer delivery, but there appears to be some difficulty in arranging for deliveries.

Steel Rails.—An occasional big order is reported for standard sections. Makers of light rails report that the plants are filled up with work.

Scrap.—Considerable scrap is now arriving in the city yards, and good sales are being made, especially of No. 1 steel, machinery scrap and railroad. There is very little railroad stuff to be had. No. 1 forge fire-scrap is held at $17, and heavy axle turnings at $16.50 per ton.

Pittsburg. March 14.

The pig iron market continues active and prices are firm, with prospects of an advance. In addition to the heavy demand, trouble with the blast furnace workers is likely to interfere with production during the next few weeks. A formal notice has not yet been given by the International Association of Blast Furnace Workers and Smelters, but it is known that the organization has prepared to demand the three-turn system, which cannot be conceded, and it may compromise on an advance in wages. The association is said to be strong in the Valleys, but it has no members, so far as known, in the Pittsburg district, and independent movements for higher pay are expected. The first occurred on Friday at the Scottdale furnaces of Corrigan, McKinney & Co., where the men went out on strike and the furnaces were banked. The company made some concessions, brought in a number of new men to take the places of strikers, and the trouble was ended last night and operations resumed. It is reported to-day that the Carnegie Steel Co. will anticipate the demands of its furnace workers and grant a voluntary advance before April 1, and in that way avert any possible trouble. Some of the independent furnace interests, it is said, will resist any demands that may be made by the men, and it is expected that some furnaces will be out of blast temporarily, pending an adjustment of the wage differences. The board of trade of Oakland, the section of the city overlooking the blast furnaces of the Jones & Laughlin Steel Co., threatens this week to go into court and compel the company to obey the order to abate the dust nuisance. If this is done, and the board succeeds in forcing the company to put its furnaces out of blast, the movement will result in an increased demand on the independent furnace interests for pig iron. The company has been trying to prevent the dust by adopting various devices, but has not wholly succeeded. It has guarded against being caught without iron, and has accumulated a stock said to be about 50,000 tons. The starting of the Columbus steel plant by the Carnegie Co. and the chilling of its Sharon furnace last week will necessitate the purchase of considerable outside iron, and it is believed the United States Steel Corporation will come into the market for fully 50,000 tons of bessemer pig iron for April delivery. The Westinghouse interests, which include the air-brake, electric, machine and signal branches, have so far closed contracts for over 25,000 tons of foundry iron. Some of the purchases were made in the open market and some were made privately, so that the total tonnage may exceed the figure given. The Virginia iron bought was at $14.75 at the furnace, or $17.30 delivered, which is 25c. a ton higher than the price paid by the Standard Sanitary Manufacturing Co. two weeks ago.

All the steel mills in the Pittsburg district are being operated to full capacity, and new business is increasing in nearly every line. The demand for billets and sheet-bars is greatly in excess of production, and for early shipment they cannot be had at any price. Premiums of from $3 to $4 are freely offered. Steel rail orders continue to come in slowly, and the mills now have on their books for 1905 delivery about 1,400,000 tons, or less than one-half the total capacity of the different plants. The iron bar market is remarkably strong, but little is doing in steel bars since prices were advanced. This is due to the fact that the bulk of the year's business in steel bars was placed before the advance was ordered. Iron bars are firm at 1.65c. Youngstown, or 1.69¾c. Pittsburg. The structural market shows a great improvement, but the heavy business expected has not yet materialized. In addition to the orders booked for the heavy steel car trade other plate business is being received almost daily, and it is not likely that the plate mills will be idle at any time this year. The sheet and tin-plate trade continues very strong, and it is certain an order of an advance in prices will be made by the leading interest before the first of the month. Another advance in wire and wire products also is expected.

The bi-monthly examination of the sales sheets for bar iron of the Republic Iron & Steel Co. to determine the rate of wages for March and April under the sliding scale of the Amalgamated Association was made yesterday. It showed that the average price of sales for the past two months was 1.4c. This advances the puddling rate from $4.90 to $5.12½ a ton, and the finishers get a corresponding increase in pay. The examination of the sales sheets for tin plate was made to-day at the offices of the American Sheet & Tin Plate Co. While the selling price for January and February was $3.55 a box, which is 15c. a box above the base of the scale, there was no advance in wages, as deliveries were made during the last two months of plates ordered before the advance in price went into effect. It is possible, however, that the average will be $3.50 at the next settlement, which will entitle the workers to an increase of 2% in wages.

Pig Iron.—Outside of the heavy tonnage contracted for by the Westinghouse interests, amounting to over 25,000 tons, sales of pig iron recorded in the Pittsburg district for the week did not exceed 10,000 tons. Prices remain firm as follows: Bessemer, $15.50@$16, Valley furnace; foundry No. 2, $16.85@$17.10, Pittsburg, and gray forge, $16@$16.15, Pittsburg.

Steel.—Billets and sheet-bars continue scarce, and premiums of from $3 to $4 over the pool price of $21 for billets and $23 for sheet-bars are offered. Prices in all finished lines are firm, tank plate being quoted at 1.60c. and merchant steel bars at 1.50c.

Sheets.—Owing to heavy purchases by consumers and jobbers in anticipation of an advance the sheet market is not so active this week. Prices are firm at 2.30c. for black sheets, No. 28 gauge, and galvanized sheets at 3.45c.

Ferro-Manganese.—The market is quiet, domestic 80% still being quoted at $45 a ton.

Chemicals and Minerals.

(See also Prices-Current, page 552.)

NEW YORK, March 15.

Milder weather has stimulated deliveries, and excepting for a few lines, prices are firm. Bromides are agitated by competition, and the recent importation of 29,000 lb. and an additional 20,000 lb. expected from Germany, intimates that the fight will continue for an indeterminate period. Cyanide is lower, 17.875@18.50c. per lb. for domestic delivery, and 14.25@14.50c. for export; but business is not large at present. An unprecedented low price for laying asphalt has just been made in Brooklyn, New York, by the Barber Asphalt Co. The successful bid was $1.39 per square yard ($139,000 in all), which compares with the contract price of $2.055 in 1903, and $1.45, the previous lowest rate. At $1.39 per sq. yd. the asphalt is worth $13.90 per short ton, which is considerably less than the market quotation. It is said that the Barber Co. holds Brooklyn contracts aggregating $158,000, representing about 10,925 tons of asphalt. Assuming that this quantity will be imported from Trinidad, the duty would be $1.50 per ton for crude asphalt, and $3 for refined, while the ocean freight may vary from $1.75 to $2 per ton. No wonder profits are small!

Copper Sulphate.—Quiet at $5.05@$5.10 per 100 lb. from second hands, and $5.20 @$5.25 from makers.

Acids.—A better feeling prevails as de-

liveries show improvement at steady prices:

Nitric acid, 36°, 100 lb.	$5.00
38°, 100 lb.	5.25
40°, 100 lb.	5.50
42°, 100 lb.	5.75
Oxalic acid, com'l, 100 lb.	5.00@ 5.25
Sulphuric acid, 50°, bulk, ton	13.50@14.50
60°, 100 lb. in carboys	1.05
60°, bulk, ton	18.00@20.00
66°, 100 lb. in carboys	1.20
66°, bulk, ton	21.00@23.00

Sulphur and Pyrite.—Sellers are apparently more anxious than buyers to consummate a deal, and onlookers are of the opinion that contracts for pyrite could now be placed at more advantageous terms than are openly quoted. In sulphur, however, there is little disposition to shade prices; in fact, there seems to be a disposition on the part of domestic producers to wait until the Sicilian combination has renewed its compact with its miners for another term of 5 or 10 years. On the other hand it is clearly evident that domestic producers would gain little by antagonizing the foreign syndicate just at this time, as such competition would only initiate lower prices. True, the Louisiana producer has a part of the cream of the consuming territory, and with the extra boilers now installed can readily double its output. Wiser counsel, however, will rule, at least until it is definitely learned what the Anglo-Sicilian Sulphur Co.'s policy will be hereafter. The Sicilian syndicate has already lost a large share of the American trade by reason of its high prices and unexpected competition, and being now in possession of the desired knowledge about the Louisiana deposits, consumers await with interest the arguments that may be put forth by the Sicilian combination to influence a renewal of its compact. Meanwhile foreign brimstone seconds are quoted nominal at $21.25 per ton, and thirds from 50@75c. per ton less. Domestic seconds at New York stand at $21.45, and prime at $21.75. Deliveries to Philadelphia and Baltimore carry an extra charge of 25c. per ton, and to Portland, Me., 15c. per ton. Spanish pyrite, unwashed lump ore, carrying from 44 to 52% sulphur, is quoted at 10@11c. per unit, and fines at 9@9.5c., f. o. b. Atlantic ports. Domestic lump ore, 42 to 44% sulphur, is worth 9.5@10c. per unit, and fines, 8.5@9c., f. o. b. shipping points.

Nitrate of Soda.—Although deliveries this year are somewhat less than 1904 by reason of the retrenchment in consumption in the fertilizer industry, prices continue firm. Refined quality at New York for prompt and nearby arrival is worth $2.45 per 100 lb., while futures are $2.275@$2.325, according to position. Ordinary quality is 2.5@5c. per 100 lb. less than refined.

Chilean Nitrate of Soda Market.—Messrs. Jackson Bros. report, under date of February 4, that sales have been limited, several transactions of 95% for January-February delivery have taken place at 7s. 8d.@7s. 8½d. alongside; for March-April 7s. 6½d. was accepted; for May, 7s. 7d. and a sale for July-December was effected at 7s. 8d. For next year deliveries, January-December sold at 7s. 1½d., and April-December, 7s. 1¼d. Little interest has been shown in the refined quality, 8s. being paid for February and April deliveries. The production in January was increased by 700,000 qtls., as compared with last year, making the increase nearly 3,000,000 qtls. for the nitrate year from April to January. We quote 95%: February-March, 7s. 8½d.; April-June, 7s. 7d.; July-December, 7s. 8d. The price of 7s. 8½d. alongside with an all around freight of 20s. stands in 9s. 7d. per cwt., net, cost and freight without purchasing commission. Sales for the fortnight amounted to 957,000 qtl., and re-sales to 99,000 quintals.

Saltpeter.—Consumption shows a falling off this year, but as the visible supply is considerably less than last year, prices are not demoralized. The consumption in the United States in February was 4,585 bags, making 7,261 bags for the two months this year, as against 9,611 bags in 1904. Stocks in store and afloat on March 1 were estimated at 9,814 bags, which compares with 16,066 bags at the same date last year. Spot crude saltpeter is worth $3.85 per 100 lb., and tendency is towards higher prices, because the supply in India has been seriously affected by inclement weather.

Sulphate of Ammonia.—Easier, spot gas liquor being noted at $3.20, and future shipments at $3.20@$3.25 per 100 pounds.

Phosphates.—There is some speculation as to the future demand, and from the viewpoint of miners prices are likely to be higher. The Florida hard rock people quote 1906 business at 6.625d@6.75d. per unit ($10.47@$10.67 per ton), c. i. f. United Kingdom or North Sea ports, and proportionately higher for other European points. The exports of Florida high-grade rock from Savannah in February amounted to 12,497 tons, principally to Germany, making 31,088 tons for the two months this year, as against 16,822 tons in the corresponding period of 1904.

The foreign movement of chemical manures in Germany in the 11 months ending November, 30, 1904, in metric tons, were:

	Imports.	Exports.
Basic slag	140,768	244,419
Guano, natural	25,880	941
Guano, artificial	23,121	1,322
Nitrate of soda	421,673	19,641
Totals	611,442	266,323

The imports were principally from Belgium, France and Chile; exports largely to Austria Hungary, Belgium, Holland, Denmark, Italy and Switzerland. Compared with the corresponding 11 months in 1903, there are shown substantial increases in the movement of basic slag and superphosphate.

Exports of chemical manures from Great Britain to Germany in the full year 1904 were 31,557 long tons, showing an increase of 1,603 tons as compared with 1903.

Phosphates.	F. o. b.	C. I. F. Gt. Britain or Europe.
*Fla., hard rock	$7.25@7.50	$10.67@11.85
land pebble	3.75@4.00	7.70@ 8.40
†Tenn., 78@80%	4.00@4.25	10.27@10.67
78%	3.75@4 00	.....
75%	3.25@3.50	.....
‡So. Car. land rock	3.50@3 75	.....
river rock	3.25@3.50	6.33@ 6.61
Algerian, 63@70%	.....	7.04@ 7.71
58@63%	.....	6.15@ 6.60
Tunis (Gafsa)	.....	6.00@ 6.60
Christmas Isle	.....	13.28@14.11
Ocean Isle	.....	13.60@14.45
Somme, Fr	.....	11.39
Basic slag, 42@50%	.....	10.21@10.44
38@45%	.....	9.48@ 9.72
30@35%	.....	7.78@ 7.90

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡ On vessel Ashley River, S. C.

Liverpool. March 1.

Messrs. Joseph P. Brunner & Co. report that outside of deliveries to the home trade business in the ordinary lines of heavy chemicals is rather dull, while prices are well maintained.

Soda ash is selling in tierces about as follows: Leblanc ash, 48%, £5@£5 10s.; 58%, £5 10s.@£6 per ton, net cash. Ammonia ash, 48%, £4 5s.@£4 10s.; 58%, £4 10s.@£4 15s. per ton, net cash. Bags, 5s. per ton under price for tierces. Soda crystals are in fair request at generally £3 7s. 6d. per ton, less 5% for barrels, or 7s. less for bags; with special terms for a few favored markets. Caustic soda is rather quiet as regards export business, but prices are steady as follows; 60%, £8 15s.; 70%, £9 15s.; 74%, £10 5s.; 76%, £10 10s. per ton, net cash. Special quotations for the Continent and a few other export quarters.

Bleaching powder receives very little attention from export buyers, and for hardwood £4 15s.@£5 per ton, net cash, is about nominal range.

Metal Market.

New York, March 15.

Gold and Silver Exports and Imports.

At all United States Ports in February and Year.

Metal.	February.		Year.	
	1904.	1905.	1904.	1905.
G'ld				
Exp	$732,614	$14,794,312	$1,324,181	$31,621 480
Imp	5,034.372	2,190,980	13.259,880	4,086,671
Exc	I. $4,301,758	E$12,603,332	I.$11,935,699	E$27,535,809
Silv				
Exp	3,940,577	4,036,075	8,927,471	8,400,820
Imp	2,106,675	2,063,293	4,716,047	3,985,495
Exc	E. $1,833,902	E. $1,972,782	E. $4,211,424	E. $4,415,335

These exports and imports cover the totals at all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, N.Y.

For the week ending March 11 and for years from January 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$1,000	$73,095	$684,776	$54,298
1905.	29,457,196	831,827	7,474,154	398,877
1904.	1,360,660	1,455,275	10,672,378	170,143
1903.	1,008,551	1,435,620	4,074,283	150,755

The gold mouement this week was chiefly with Central America, of silver with London and Central America.

The foreign merchandise trade of the United States for the two months ending Feb. 28 is valued by the Bureau of Statistics of the Department of Commerce and Industry as below:

	1904.	1905.
Exports	$260,845,452	$232,436,452
Imports	171,612,366	201,417,400
Excess exports	$89,233,086	$31,019,052
Add excess of exports, silver		4,415,335
Add excess of exports, gold		27,535,809
Total export balance		$62,970,196

The gold and silver movement in detail will be found at the head of this column. It will be seen that there was a decrease of $28,409,000 in exports of merchandise, with an increase of $29,805,034 in imports, the net result being a reduction of $58,214,034 in the export balance.

There is little new to record in general trade, while the speculative markets continue mainly under the influence of large dealers.

The statement of the New York banks—including the 53 banks represented in the Clearing House—for the week ending March 11 gives the following totals, com-

parison being made with the corresponding week of 1904:

	1904.	1905.
Loans and discounts	$997,399,000	$1,132,920,300
Deposits	1,037,268,900	1,187,665,800
Circulation	37,962,600	42,864,500
Specie	219,135,100	221,189,700
Legal tenders	70,119,200	85,004,900
Total reserve	$289,254,300	$306,194,600
Legal requirements	259,317,225	296,916,450
Balance surplus	$29,937,075	$9,278,150

The following table shows the specie holdings of the leading banks of the world. The amounts are reduced to dollars:

	Gold.	Silver.
N. Y. Ass'd	$221,189,700	
England	198,749,440	
France	559,901,135	$220,054,430
Germany	203,235,000	67,750,000
Spain	74,720,000	102,840,000
Netherlands	30,045,000	31,375,000
Belgium	16,173,335	8,086,665
Italy	111,515,000	16,486,000
Russia	509,912,000	30,480,000
Austria	240,260,000	64,170,000

The returns of the Associated Banks of New York are of date March 11 and the others March 9, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Silver has shown a tendency to yield in price. Some speculative accounts having been sold out, the price was forced down, and India buying only on a moderate scale, we quote the close at 26 15-16d. in London.

The United States Assay Office in New York reports receipts at 74,000 oz. of silver during the week.

Shipments of silver from London to the East for the year up to March 2 are reported by Messrs. Pixley & Abell's circular as follows:

	1904.	1905.	Changes.
India	£2,714,039	£1,406,387	D. £1,307,652
China	71,000	1,370	D. 69,630
Straits	58,103	2,800	D. 55,303
Totals	£2,843,142	£1,410,557	D. £1,432,585

Receipts for the week this year were £152,000 in bar silver from New York, and £3,000 from Australia; total, £155,000. Shipments were £193,700 in bar silver to India.

Indian exchange has been weaker, as the season of imports in India is passing over. The Council bills offered in London were taken at 16d. per rupee. Buying of silver for India has been very light.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.45	$0.48½
Peruvian soles and Chilean pesos	.42	.45½
Victoria soverigns	4.85	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.78	4.82

Other Metals.

SILVER AND STERLING EXCHANGE.

March	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	March	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
9	4.86¼	59½	27 5/16	13	4.86¼	59	27 3/16
10	4.86¼	59½	27 5/16	14	4.86¼	58½	27
11	4.86¼	58¾	27	15	4.86¼	58½	26 15/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, .925 fine.

Daily Prices of Metals in New York.

March.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
9	15¼@15⅝	15@15¼	68½	29½	4.45	6.20	6.05
10	15¼@15⅝	15@15¼	68⅝	29⅝	4.45	6.20	6.05
11	15¼@15⅝	15@15¼	..	29⅝	4.45	6.20	6.05
13	15¼@15⅝	15⅛@15⅜	69	29⅝	4.45	6.20	6.05
14	15¼@15⅝	15⅛@15¼	68¼	29⅝	4.45	6.20	6.05
15	15¼@15⅝	15⅛@15¼	68½	29⅝@29¾	4.45	6.20	6.05

London quotations are per Long Ton (2,440 lbs.) standard copper, which is now the equivalent of the former g. m. bs. The New York quotations for electrolytic copper are for cokes, ingots or wirebars: Cathodes are usually 0.25c. below the quotation for electrolytic.

Copper.—The market has continued very strong, in spite of home trade, buyers remaining practically out of the market, and, with the exception of car-load lots, no business of importance being reported. On the other hand, the demand for export has been excellent, and large quantities have been placed in Europe, while the demand for China and Japan, for the time being, has subsided. A much broader market is also reported in copper shares. The market closes steady and firm, at 15¼@15⅜ for lake; 15⅛@15¼ for electrolytic, in cakes, wirebars or ingots; 14⅞@15 for cathodes; 14¾@14⅞ for casting copper.

The bull operations in London brought about an advance to about £69, but there has been a slight reaction, the last quotations on Wednesday being cabled as £68 10s. for spot, £68 17s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £71@£71 5s.; best selected, £71 10s.@£72 10s.; strong sheets, £79 10s.@ £80; India sheets, £76@£76 10s.; yellow metal, 6⅝@6¾d.

Exports of copper from New York and Baltimore for the week ending March 14 were 3,514 long tons, principally to Germany, Holland and Austria. Imports for the week of March 10 were 64 tons copper and $31,399 worth of ore (quantity not given).

Tin.—The London market has right along ruled above the import point, and the strength displayed over there has encouraged buyers here to absorb whatever tin was offered at the relatively low prices. The result shows itself in a growing scarcity of spot supplies and very much higher prices all around. The market closed firm, at 29⅝@29¾ for spot, 29⅜@29½ for futures.

The London market, which closed last week at £133 for spot, £131 12s. 6d. for three months, opened on Monday very much firmer, at £134 15s. for spot, £132 7s. 6d. for three months. On Tuesday it passed the £135 mark, but there was a slight reaction at the close, the quotations on Wednesday being cabled as £134 5s. for spot, £133 2s. 6d. for three months.

Lead.—A steady increase in the demand for lead can be noted in all lines of manufacture. There is no change in prices, which remain 4.37½, St. Louis, 4.45 New York.

The advance in the foreign market, about which we reported last week, has been maintained. The quotations at the close are cabled as £12 5s. for Spanish lead, £12 7s. 6d. for English lead.

St. Louis Lead Market.—The John Wahl Commission Co. telegraphs us as follows: Lead is steady, at 4.37½c. for Missouri brands and ordinary desilverized. Corroding lead is held at a higher figure.

Spelter.—The market is rather quieter, as consumers appear to have supplied themselves for this month. Prices have been shaded somewhat. It is expected, however, that owing to the very high consumption, an early revival in the demand may be looked for. The closing quotations are 6.20, New York, 6.05, St. Louis.

The foreign market has remained steady, at £24 for good ordinaries, £24 5s. for specials.

St. Louis Spelter Market.—The John Wahl Commission Co. telegraphs us as follows: Spelter is on the down grade, and the late boom seems to have temporarily collapsed. The latest sales here are on the basis of 6.07½c., East St. Louis. A lack of demand and increased offerings appear to be the cause of the decline.

Silesian Spelter Market.—Herr Paul Speier reports from Breslau, under date of Feb. 27, that there has been some hesitation in the market, with an apparent decline of consumption and a falling off in speculation. The Silesian smelters have held their prices firm, and for the present their quotations are nominal. Some metal has been sold by second hands at 24.75 marks per 50 kg., f. o. b. cars at Breslau. This is equivalent to 5.34c. per lb. It looks as if consumption was at a standstill for the present. For zinc sheets the market and prices are unchanged. For zinc dust the market is quiet, and for the present there is little demand from abroad. The exports from Germany in January included 5,336 tons of spelter, 1,704 tons of zinc sheets, 211 tons of scrap, 1,207 tons of zinc white, 448 tons of lithophone and 2,772 tons of zinc ore. Imports for the month were 1,430 tons of spelter, 3 tons of sheets, 187 tons of scrap, 349 tons of zinc white, 31 tons of lithophone and 11,291 tons of zinc ore.

Antimony.—The main business has been done in the outside brands, which can be bought at 7⅜@7½c. The demand is on a satisfactory scale.

Nickel.—Producers quote 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots is higher, according to quantity, running up to 60c. for small orders.

Platinum.—Quotations are firm at $21 per ounce. Gas engine sparking points vary from 87c. each for "A," to $1.80 for "B."

Platinum in manufactured forms is strong. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 80c.; crucibles and dishes, 85c.; perforated ware, 90c., and cones, $1 per gram.

Quicksilver.—Quicksilver is easy, at $38 @$38.50 per flask in large lots, while $40 is the price for smaller orders. San Francisco prices are lower, $37.50@$39 per flask being quoted for domestic orders, with some discount for export. The London price is better, at £7 15s., with the same figures quoted by second hands.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted

at 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality, and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices are, f. o. b. works:

	Per lb.
Aluminum.	
No. 1, 99% ingots.	33@37c.
No. 2, 99% ingots.	31@34c.
Rolled Sheets	4c. up.
Aluminum-Bronze.	20@23c.
Nickel-alum	33@39c.
Bismuth	$2.10
Chromium, pure (N. Y.)	80c.
Copper, red oxide.	50c.
Ferro-Molybdenum (50%)	$1.00
Ferro-Titanium (20@25% N. Y.)	75c.
Ferro-Chrom. (74%)	12½c.
Ferro-Tungsten (37%)	45c.
Magnesium, pure (N. Y.)	$1.60
Manganese, (98@99% N. Y.)	75c.
Manganese Cu., (30@70% N. Y.)	40c.
Molybdenum, (98@99% N. Y.)	$2.75
Phosphorus, foreign.	45c.
Phosphorus, American	70c.
Tungsten (best)	$1.25

Prices vary chiefly according to size and terms of orders.

Missouri Ore Market.

Joplin, March 11.

The highest price reported paid for zinc ore was $53 per ton for three bins of ore, and the assay basis price ranged from $46 to $49 per ton of 60% zinc. The purchases of the week were very heavy, but heavy roads, occasioned by spring rains, caused the shipment to be 220 tons less than the previous week. The weather is fine for mining operations and the output is large. The demand has kept pace with the increased supply, and the purchasing agents, who have been in the West, are back in the district taking a portion of the increased supply of zinc ore. This fact easily proves the relative value of the ores of this district and of the West. Although it is claimed that they can get an unlimited supply and at astonishingly low prices in some localities, they are not willing to forsake entirely this district with its high-priced ore. It was noted in this column last year that it was apparently a physical impossibility for this district to supply all the zinc ore needed to manufacture all the spelter demanded by American consumers, consequently, as this district does not keep pace with the increasing output of spelter, it becomes necessary each year to secure a larger proportion from some other source. If the western ore exists in unlimited quantities, it certainly does not answer all the other requirements, or prices would not be maintained so high here.

The general price for lead ore was $57 per ton, but several bins sold at $58 per ton. There was considerable competition among local buyers for the increased production, and they succeeded in loading 54 more tons than the previous week.

Following are the shipments of zinc and lead ore from the various camps of the district for the week:

	Zinc, lb.	Lead, lb.	Value.
Joplin	3,075,740	256,890	$87,280
Carterville-Webb City	2 478,650	621,190	78,430
Duenweg	924,740	121,570	26,590
Prosperity	288,440	231,480	13,670
Galena-Empire	406,810	110,860	12,720
Badger	483,300	.....	11,320
Alba	461,890	.....	11,000
Neck City	409,330	.....	10,850
Carthage	408,400	.....	10,210
Aurora	504,000	.....	9,240
Oronogo	267,800	1,990	6,615
Granby	412,470	44,000	5,920
Zincite	180,640	4,290	4,640
Spurgeon	56,720	.....	1,170
Beef Branch	86,780	14,000	1,130
Totals	10,445,710	1,406,270	$290,785
Ten weeks	80,311,520	9,253,960	$2,322,975

Zinc value, the week, $250,720; ten weeks $2,053,140. Lead value, the week, $40,065; ten weeks, $269,835.

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London	
	1904.	1905.	1904.	1905
January	57.055	60.690	26.423	27.930
February	57.592	61.023	26.665	28.047
March	56.741	.....	26.164	.....
April	54.202	.....	24.974	.....
May	55.430	.....	25.578	.....
June	55.673	.....	25.644	.....
July	58.095	.....	26.760	.....
August	57.806	.....	26.591	.....
September	57.120	.....	26.349	.....
October	57.923	.....	26.760	.....
November	58.453	.....	26.952	.....
December	60.563	.....	27.930	.....
Year	57.221	.....	26.399	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

COPPER IN NEW YORK.

Month.	Electrolytic.		Lake.	
	1904.	1905.	1904.	1905.
January	12.410	15.008	12.553	15.128
February	12.063	15.011	12.245	15.136
March	12.299	.....	12.551	.....
April	12.923	.....	13.120	.....
May	12.758	.....	13 000	.....
June	12.269	.....	12.399	.....
July	12.380	.....	12.505	.....
August	12.343	.....	12.468	.....
September	12.495	.....	12.620	.....
October	12 993	.....	13.118	.....
November	14.284	.....	14.456	.....
December	14.661	.....	14.849	.....
Year	12.823	.....	12.990	.....

Prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars: cathodes are usually 0.25c lower.

COPPER IN LONDON.

Month.	1904.	1905.	Month.	1904.	1905
Jan.	57.500	68.262	July.	57.256	.....
Feb.	56.500	67.963	August	56.952	.....
March	57.321	.....	Sept.	57.645	.....
April	58.247	.....	Oct.	60.012	.....
May	57.321	.....	Nov.	65.085	.....
June	56.398	.....	Dec.	66.384	.....
			Av., year	58.857	.....

Prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905
Jan.	28.845	29.325	July.	26.573	.....
Feb.	28.087	29.262	August	27.012	.....
March	28.317	.....	Sept.	27.780	.....
April	28.132	.....	Oct.	28.596	.....
May	27.718	.....	Nov.	29.185	.....
June	26.325	.....	Dec.	29.286	.....
			Av., year	27.986	.....

LEAD IN NEW YORK.

Month.	1904.	1905.	Month.	1904.	1905.
Jan.	4.347	4.552	July.	4.192	.....
Feb.	4.375	4.450	August	4.111	.....
March	4.475	.....	Sept.	4.200	.....
April	4.475	.....	Oct.	4.200	.....
May	4. 23	.....	Nov.	4.200	.....
June	4.496	.....	Dec.	4.600	.....
			Av., year	4.309	.....

SPELTER.

Month.	New York.		St. Louis.	
	1904.	1905.	1904.	1905.
January	4.863	6.190	4.673	6.032
February	4.916	6.139	4.717	5.989
March	5.057	.....	4.841	.....
April	5.219	.....	5.038	.....
May	5.031	.....	4.853	.....
June	4.760	.....	4.596	.....
July	4.873	.....	4.723	.....
August	4.866	.....	4.716	.....
September	5.046	.....	4.896	.....
October	5.181	.....	5.033	.....
November	5.513	.....	5.363	.....
December	5.872	.....	5.720	.....
Year	5.100	.....	4.931	.....

Dividends.

Company.	Payable.	Rate.	Amount.
†Ala. Con. C. & I., pf	Mar. 1	$1.75	$43,115
Alaska-Mexican	Feb. 28	1.00	180,000
Alaska-Treadwell	Feb. 28	1.50	300,000
‡Am. Agri. Chem., pf	Apr. 1	3.00	544,050
American Coal	Mar. 1	1.25	62,500
*Bunker Hill & Sullivan	Mar. 4	.25	150,000
†Calumet & Hecla	Mar. 23	15.00	1,500,000
Calumet & Arizona	Mar. 20	2.00	400,000
*Caribou Oil, Cal	Mar 15	.07	5,600
Central Eureka, Cal.	Mar. 9	.07	28,000
*Central Lead, Mo	Mar. 28	.50	5,000
*Claremont Oil, Cal.	Mar. 1	.01	4,500
Cripple Creek Con.	Mar. 25	.005	10,000
*Dos Estrellas, Mex.	Mar. 15	13.73	41,190
†Federal Mg.&Sm., com.	Mar. 15	2.50	125,000
†Federal, pf.	Mar. 15	1.75	175,000
*Four Oil, Cal.	Mar. 15	.01	3,000
†General Chemical, pf	Apr. 1	1.50	150,000
Greene Con. Gold	Mar. 25	.20	100,000
Homestake, S. D.	Mar. 25	.50	109,200
Horn Silver, Utah	Mar. 31	.05	20,000
*Imperial Oil, Cal.	Mar. 6	.20	20,000
Iron Silver, Colo	Mar. 4	.10	50,000
Kern River Oil, Cal	Mar 1	.15	3,000
La Victoria y An.	Mar. 15	2.33	5,813
*Lightner, Cal.	Mar. 20	.05	5,113
*Mines Co. of Am.	Mar. 20	.01½	30,000
*Monte Cristo Oil, Cal	Mar. 10	.01	5,000
*National Lead, pf.	Mar. 15	1.75	260,820
‡New Haven I & St.	Apr. 6	.15	15,000
*N. Y. & Hond. Rosario	Mar. 25	.10	15,000
†Oil City Petroleum, Cal	Mar. 1	.00½	2,500
*Pacific Coast Borax	Mar. 29	1.00	19,000
Parrot, Mont.	Mar. 13	.50	114,925
*Peerless Oil, Cal	Mar. 1	.14	12,880
*Penna Con., Cal	Mar. 15	.10	5,150
Phila. Gas, pf	Mar. 1	1.25	143,620
Providencia, Mex	Mar. 1	.92	5,520
Santa Maria de la Paz	Feb. 28	2.30	5,520
*Silver King, Utah	Mar. 25	.66⅔	100,000
*Soledad, Mex	Feb. 20	7.13	6,840
*Sorpressa, Mex	Feb. 20	2.38	2,280
†Standard Oil	Mar. 15	15.00	14,550,000
Stratton's Independence	Feb. 28	.12½	125,000
*Thirty-three Oil	Mar. 6	.10	10,000
*Twenty-eight Oil, Cal.	Mar. 1	.15	9,000
*Union Oil, Cal.	Mar. 20	.50	26,336
†United Gas Imp	Apr. 15	2.00	180,000
*United Petroleum, Cal.	Mar. 20	.80	11,744
†U. S. Steel, pf.	Feb. 28	1.75	6,304,919
‡Wolverine, Mich.	Apr. 1	5.00	300,000

*Monthly. †Quarterly. ‡Semi-Annual.

Assessments.

Company.	Delinq.	Sale.	Amt
Alta-Sierra, Cal.	Mar. 27	Apr. 17	.30
Austrian Syndicate, Cal.	Mar. 27	.....	.00½
Beaver Harrison, Utah	Feb. 23	Mar. 16	.02
Belcher, Nev.	Mar. 15	Apr. 5	.10
Blue Eagle, Utah	Mar. 4	Mar. 25	.00½
Black Rock Copper, Utah	Mar. 7	Mar. 27	.01
Brunswick Con., Cal.	Mar. 21	.....	.03
Burlington, Utah	Feb. 15	Mar. 15	.00½
Centennial Copper, Mich	Apr. 10	.....	2.00
Centennial Copper, Mich	Aug. 10	.....	2.00
Con. St. Gothard, Cal.	Mar. 17	.....	.05
Emerald, Utah	May 14	June 10	.01½
Exchequer, Nev.	Mar. 8	Mar. 29	.05
Great Eastern, Utah	Mar. 15	Apr. 1	.00½
Hale & Norcross, Nev	Mar. 7	Mar. 31	.10
Halifax-Tonopah, Nev	Mar. 6	Apr. 6	.10
Horn, Cal.	Mar. 25	.....	.01
Idaho, Utah	Mar. 1	Apr. 1	.00½
Jackson Butte, Cal.	Mar. 16	.....	.02
Joe Bowers, Utah.	Mar. 3	Mar. 18	.01½
Julia Con., Nev.	Mar. 28	Apr. 18	.03
Little Chief, Utah.	Mar. 6	Mar. 24	.01
Manhattan, Utah	Mar. 10	Mar. 30	.01
Mayflower, Utah.	Mar. 9	Mar. 25	.00½
Mexican, Nev.	Apr. 11	.....	.15
Potosi, Nev.	Feb. 21	Mar. 15	.10
Reamer Con., Cal.	Mar. 31	.....	.10
Santa Rita, Cal.	Mar. 20	.....	.05
Savage, Nev	Apr. 7	Apr. 27	.10
Sonora Quartz, Mex.	Mar. 31	.....	.01
Spanish Ridge, Cal.	Apr. 13	.....	.05
Union Con., Nev.	Feb. 24	Mar. 16	.15
Yuba Con., Cal	Mar. 20	.....	.02

Colorado Springs (By Telegraph).

Company	March 13		March 14	
	H.	L.	H.	L
Anaconda.	.15½	.15	.17	.16½
C. K. & N.	.19	.17	.20	.19
Cripple Ck. Con.	.12	.11½	.12	.11½
Doctor Jack Pot	.03½	.03½	.04	.03½
Elkton Con.	.55	.54½	.53	.52½
El Paso.	1.98	1.97½	1.99	1.98½
Isabella.	30½	.29	.31	.30½
Moon Anchor.	.07	.06½	.06½	.06½
Old Gold.	.09½	.07	.08	.07
Portland.	1.95	1.93	1.95	1.93
Vindicator Con.	.80	.78	.80	.78
Work	15½	.14½	.15½	.15

STOCK QUOTATIONS.

Salt Lake City.

March 10

Company.	Par Val.	High.	Low.	Shares.
Ajax	$1	17¢	.17	400
Beck-Tunnel	....	.09	.09	2,000
Butler-Liberal	....	18	.13½	22.950
Carisa	....	.09½	.09	1,500
Century	....	.05	.05	1,000
Daly	....	2.75	2.75	100
Daly-Judge	....	6.25	6.25	100
Daly-West	20	16.75	16.27½	100
Grand Central	20	3.10	3.00	300
Ingot	1	.02	.01¢	2,000
Little Chief	1	.02	.01¢	20,000
May Day	25	.13¢	.12	9,900
Martha Washington	1	⅝	⅜	4,000
New York Bonanza		.55	.44½	19,700
Petro	1	.14½	.14½	500
Silver Shield	5	.13	.11¢	6,000
Star Con	1	.14½	14	2,000
Tetro	....	.21½	.20	3,100
Uncle Sam	1	.31½	.29	8,000
Victor Con	1	.04½	.04½	2,000
Victoria	1	1.80	1.80	350
Yankee Con	1	.37	.35½	1,500

Total sales 107,500 shares.

St. Louis, Mo.*

March 11.

Company.	Par Val.	Bid.	Ask.
Am. Nettie, Colo	$10	$0.10	$0.25
Center Creek	10	1.35	1.80
Central Coal & C	100	66.00	70.75
Central C. & C., Pf	100	77.50	81.00
Central Lead, Mo	100	120.00	125.00
Columbia Lead Mo	10	.25	1.50
Con. Coal, Ill	100	28.00	30.00
Doe Run Lead, Mo	100	117.50	125.00
Granite Bimet., Mont	10	.35	.45
St. Joe Lead, Mo	10	16.50	17.50

*By our Special Correspondent.

Montreal.*

March 11.

Company	Par Val.	High.	Low.	Sales.
Dominion Coal	100	72.00	71.75	100
Dominion Coal, Pf	100	....	....	....
Dom. I. & St	100	24.00	23.25	235
Dom. I. & St., Pf	100	74.50	72.50	52
Montreal Steel	100	....	....	....
Montreal Steel, Pf	100	....	....	....
Nova Scotia St	100	62.50	60.00	395
N. S. Steel, Pf	100	....	....	....

*Montreal Stock Exchange.
Total sales, 782 shares.

San Francisco.*

March 9.

Company.	Location.	Opening. H.	Opening. L.	Closing. H.	Closing. L.	Sales.
MacNamara	Nev.	.53	.50	.45	.41	33,100
Mont. Tonopah	Nev.	2.95	....	292½	2.90	8,650
Ton. Belmont	Nev.	....	....	....	....	....
Ton. Midway	Nev.	....	....	112½	107½	6,400
Ton. Mg. Co.	Nev.	....	....	12.00	....	450
Ton. North Star	Nev.	.60	.57	.47	.44	26,600

*San Francisco & Tonopah Exchange.
Total sales, 75,200 shares.

San Francisco (By Telegraph).

Company.	March 13	March 14
Belcher	.20	.21
Best & Belcher	.94	.90
Caledonia	.54	.52
Challenge Con.	.15	.14
Chollar	.13	.15
Confidence	.66	.67
Con. California & Virginia	1.75	1.70
Crown Point	.08	.08
Gould & Curry	.18	.17
Hale & Norcross	.67	.71
Mexican	1.80	1.80
Ophir	7.00	6.87
Overman	.16	.15
Sierra Nevada	.42	.41
Union Con	.66	.63
Yellow Jacket	.14	.14

New York.

Company.	Par Val.	Mar. 8 H.	Mar. 8 L.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 13 H.	Mar. 13 L.	Mar. 14 H.	Mar. 14 L.	Sales.
Alice	25	....	....	1.00	....	1.00	....	....	....	1.10	....	1.25	....	700
Amalgamated	100	78½	77½	80½	78¾	81⅛	80⅛	81½	80½	81⅛	80½	81½	80½	449,242
Anaconda	25	112½	109½	121	115½	122¾	122	122½	121	123	120	119½	119	55,110
Best & Belcher	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Brunswick	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Caledonia	1	....	....	....	....	....	....	....	....	58	....	....	....	100
Challenge	2½	....	....	....	....	.16	....	....	....	....	....	....	....	300
Chollar	2½	....	....	....	....	....	....	....	....	....	....	....	....	....
Confidence	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Cal. & Va.	2½	1.90	....	....	....	1.70	....	1.70	....	....	....	1.70	....	650
Daly	20	....	....	....	....	2.40	....	....	....	....	....	....	....	30
Elkton Con	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Federal Mining and Smelting	100	105	101	105½	105	115	106	116	114	114	112	....	....	3,200
Preferred	100	94½	90½	95½	93½	96	94⅝	95⅝	95	95⅝	94½	96	94½	31,295
Greene Consolidated Copper	10	28	27½	29½	28	29½	29	29½	29⅛	29½	29½	29⅞	29⅜	36.400
Greene Consolidated Gold	10	8⅛	8⅛	8⅛	8	8⅛	8	8⅛	8	8⅛	8⅛	8⅛	8⅛	17,000
Hale & Norcross	3	....	....	1.50	....	....	....	....	....	....	....	....	....	200
Homestake	100	.76	....	....	....	....	....	....	....	....	....	.77	.75	285
Horn Silver	20	1.80	1.75	....	....	....	....	....	....	....	....	....	....	300
Iron Silver	20	2.50	....	....	....	....	....	3.00	....	....	....	....	....	200
Isabella	1	....	....	....	....	....	....	....	....	.30	.29	....	....	1,000
Little Chief	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Mexican	3	1.90	....	1.75	....	....	....	....	....	....	....	1.80	1.75	500
Mollie Gibson	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Occidental	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Ontario	100	....	....	3.75	....	....	....	....	....	....	....	....	....	35
Ophir	37	7.00	....	....	....	6.75	....	....	....	....	....	....	....	175
Phoenix	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Portland	1	1.95	....	....	....	....	....	1.95	....	1.95	....	....	....	600
Potosi	1	17	.16	....	....	.14	.13	.15	.14	.14	....	....	....	1,500
Quicksilver	100	....	....	....	....	....	....	1.35	....	....	....	....	....	100
Quicksilver, pf	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Savage	3	....	....	.27	.25	.23	....	....	....	.20	....	.17	....	1,000
Sierra Nevada	3	....	....	....	....	....	....	....	....	....	....	....	....	....
Silver Hill	1	....	....	.64	....	....	....	....	....	....	....	....	....	200
Standard Con	10	1.85	....	....	....	....	....	....	....	2.00	....	....	....	300
Syndicate	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Tennessee Copper Common	25	29½	29½	30½	29½	31½	30⅜	31½	31½	....	....	32	....	3,655
Union Consolidated	1	....	....	.70	....	....	....	....	....	....	....	.68	.67	300
United Copper	100	8	....	8½	....	9	8	8½	....	....	....	....	....	1,500
Utah	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Yellow Jacket	3	....	....	....	....	....	....	....	....	....	....	.14	....	200

Total sales, 606,077 shares.

Boston.

Company.	Par Val.	Mar. 8 H.	Mar. 8 L.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 13 H.	Mar. 13 L.	Mar. 14 H.	Mar. 14 L.	Sales.
Adventure Con	$25	6	5½	6	....	6	....	....	....	6½	6	7	....	1,110
Allouez	25	22½	22½	23	22½	23⅜	23	23½	23½	24	23⅜	24	23½	5,198
Amalgamated	100	78¼	77½	80⅜	78¼	81½	80½	81½	80½	81⅜	80½	81½	80½	44,062
Am. Z. L. & Sm.	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Anaconda	25	27½	....	30	28½	30½	30	30½	....	30½	....	30	....	780
Arcadian	25	....	....	1½	1	....	....	....	....	2	1½	1½	1½	465
Ash Bed	25	....	....	....	....	....	....	....	....	....	....	1½	....	200
Atlantic	25	16½	16	16½	16	16½	....	17	16½	18½	16½	18½	17½	8,528
Bingham Con	50	31½	31	31½	31½	32	31½	32½	32	33	32½	33	32½	2,829
Bonanza Dev. Co	10	....	....	....	....	.80	....	....	....	....	....	....	....	150
Boston Con	10	7	....	....	....	....	....	7	6½	7	6½	....	....	475
Calumet & Hecla	25	670	....	675	....	675	670	677	....	683	677	683	682	159
Catalpa	10	....	....	....	....	15	....	....	....	....	....	....	....	450
Centennial	25	19	18½	19½	18½	19½	19½	20	19½	.20	19½	20	19½	3,130
Con. Mercur	5	....	....	....	....	.37	....	....	....	....	....	....	....	100
Continental Zinc	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Range	100	73¾	72	73½	72¾	75½	73	80	77	81½	79½	83	81½	117,510
Daly-West	20	17	16½	17	16½	16⅝	16	16½	16	16½	16	16½	16½	1,470
Elm River	12	2½	....	3	2½	3	2⅞	....	....	3	....	3½	....	1,170
Franklin	25	....	....	11½	10½	11½	....	11⅝	11	11½	11½	12½	11½	3,670
Granby Con	10	5½	5	5⅝	5½	5½	5½	5½	5⅝	6½	5½	6½	6½	39,745
Greene Con	10	28½	28	29½	28½	29½	28½	29⅝	29	29½	29½	29½	29½	29,518
Guanjuato Con	10	4	3½	4½	4	4½	4½	4½	....	4½	4½	5	4⅜	17,300
Humboldt	25	....	....	1½	....	....	....	....	....	....	....	....	....	100
Isle Royale Con	25	24	....	25½	24½	26½	25	28	26	28½	27½	28½	27½	7,068
Mass Con	25	12½	12½	12½	12½	13	12½	13⅞	13	13½	12½	13	....	6,270
Mayflower	25	1	....	1	....	1	....	....	....	1	....	1	....	885
Michigan	25	14½	14½	14½	14½	15½	14½	15½	14½	15½	14½	15½	15	9,445
Mohawk	25	55½	54½	56½	54½	56½	55½	56½	55½	56	55	56½	55½	9,192
Montana Coal & Coke	25	3½	3½	3½	3½	3½	3½	4	3½	4	3½	3½	3½	6,557
National	25	....	....	....	....	....	....	....	....	1½	....	2	1	280
New Idria	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony	25	....	....	....	....	....	....	....	....	1½	....	1½	....	300
Old Dominion	25	26½	26	27½	26	27½	27	27½	27	27¼	27	28	27½	4,395
Osceola	25	93½	93	94½	93	95	94½	95	....	100	96	103	99	9,350
Parrot	10	28½	....	29½	28	29½	29½	29½	....	30	29½	30½	30	2,265
Phoenix Con	25	3	2½	2⅝	2½	3	....	3	2⅝	3	....	3	....	1,640
Quincy	25	105	....	108½	106	108	107	107	....	110	....	112	110	333
Rhode Island	25	....	....	2	....	....	....	2	....	2	1½	2½	2	1,410
Santa Fe	10	2½	....	....	....	....	....	....	....	2½	2½	2½	....	400
Shannon	10	8	7½	8	7½	8	7½	8½	8	8½	8½	8½	8½	5,937
Tamarack	25	128½	....	130	129	132	130	132	130	135	130	140	135	1,197
Tecumseh	25	3½	....	3½	3½	3½	3½	3½	3½	3½	3½	3½	3½	5,860
Tennessee	25	....	....	....	....	31	30	32½	....	....	....	....	....	200
Trinity	25	11	10½	11	10	12½	10½	13	12½	13	11½	12½	12	21,208
Union Cop. L'd. & Mg	25	....	....	....	....	....	....	....	....	....	....	....	....	....
United Copper Co	100	....	....	....	....	9	....	....	....	....	....	....	....	40
United States	25	24½	24½	25½	24½	26½	25½	27½	26½	27½	27	27½	26½	41,675
U. S. Coal & Oil	25	10	9½	....	....	9½	9½	....	....	10	9½	10	....	1,750
Utah Con	5	41½	40	41½	40½	41½	41½	41½	41½	41½	40½	41½	40½	9,520
Victoria	25	4½	4½	4½	4½	....	....	5	4½	5½	5	5½	5	1,475
Winona	25	14	13½	14	13½	15	14	15	14½	15	14½	15½	14½	5,370
Wolverine	25	119	118	118	117	118	117	119½	119	120	119	119½	119	930
Wyandot	25	....	....	....	....	2½	2½	2½	2⅜	2½	2½	2½	....	790

Total sales, 433,762 shares.

STOCK QUOTATIONS.

London (By Cable).*

Company.	Mar. 14 £	s.	d.	Company	Mar. 14 £	s.	d.
Camp Bird	1	12	6	Esperanza	.	19	0
Con. Gold Fields	7	17	6	Modderfontein	10	10	0
De Beers	18	0	0	Rand Mines	10	17	6
Dolores	1	9	0	Rio Tinto	66	16	3
East Rand	8	6	3	Simmer & Jack	2	2	6
El Oro	1	5	0	Tomboy	1	6	3

*Furnished by Wm. P. Bonbright & Co., 24 Broad St., New York

Coal, Iron and Industrial Shares.

Company.	Par Val.	Mar. 8 H.	Mar. 8 L.	Mar. 9 H.	Mar. 9 L.	Mar. 10 H.	Mar. 10 L.	Mar. 11 H.	Mar. 11 L.	Mar. 13 H.	Mar. 13 L.	Mar. 15 H.	Mar. 15 L.	Sales.
Allis-Chalmers	$100	17⅛	....	17⅜	17	17	16½	16⅝	16½	17	....	17⅛	17	2,600
Preferred	100	....	....	63½	....	63⅛	61	63	62	61	60	62	61	1,500
Am. Agri. Chem.	100	....	....	21	....	....	....	....	....	....	....	....	....	100
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref.	100	94⅝	93	99⅜	94⅝	99½	98½	99¼	98	99	98	102	98½	286,545
Preferred	100	121½	119½	123½	120⅝	123¼	122½	123	122¼	122½	122½	123¾	122¼	21,430
†Cambria Iron	50	49½	....	49½	....	49¼	....	....	....	49½	....	....	....	85
†Cambria Steel	50	27½	27	27⅝	27	27¼	27½	27¼	27¼	27½	27⅝	....	....	5,886
Col. Fuel & Iron.	100	51⅛	50⅛	52	51⅛	53	51⅞	53	52⅝	55½	52⅝	54⅛	53⅛	93,600
Preferred	100	100	....	100	....	....	....	....	....	....	....	....	....	200
Col. & H. C. & I	100	....	....	17⅛	16½	17⅛	17⅛	18	17⅛	18⅛	17½	17⅛	17½	7,500
General Chem.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	103½	....	100
†Lehigh Nav.	50	106½	....	106½	106	106	....	105⅞	....	106½	106	....	....	1,330
*Mong. R. Coal	100	....	....	....	....	10	9½	10½	....	....	....	10	....	178
Preferred	100	....	....	28½	28	29½	28½	29	....	29	....	29	....	1,556
National Lead	100	37½	36½	38	35⅞	39	38	38½	37½	37½	36⅞	38½	36½	51,150
Preferred	100	106	105½	107⅝	106	108	107½	109	108	108	....	108⅝	107½	4,875
Phila. Nat. Gas	50	43½	43½	43¼	43½	44½	44¼	44⅞	44½	45	44½	....	....	6,933
Preferred	50	48	....	....	....	47½	....	47⅞	....	47⅞	47½	....	....	393
Pittsburg Coal	100	20½	....	20¼	....	20⅜	....	20½	20	20¼	....	20½	19⅞	2,852
Preferred	100	80	....	80½	79⅛	80	79⅜	80	79½	80⅛	80	79½	75	2,897
Republic I. & S.	100	18½	18½	19⅛	18½	20⅛	19⅛	20½	20	20	19⅜	20	19½	13,000
Preferred	100	76	....	77	76	77½	76½	77¾	76¾	77	76½	76½	76¼	7,500
Sloss Shef. S. & I.	100	....	....	91½	89½	91½	94	91	....	....	....	93	89	1,700
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Standard Oil	100	617	615	....	....	617	615	617	616	617	....	622½	619	183
Tenn. C. I. & R. R.	100	88⅛	86⅞	90	87⅞	93⅝	90	93	91⅝	92⅝	91½	92⅝	91	39,400
U. S. Steel Corp	100	36⅝	35⅝	36⅜	36¼	36⅞	36¾	37	36⅝	37⅜	36⅝	37	36⅜	269,992
Preferred	100	95⅞	94⅞	96¼	95⅞	96⅛	95⅝	96⅜	96⅛	97⅛	90½	97⅛	96⅛	169,490
Va. Car. Chem	100	36	35½	37	36⅜	36½	36	36	35	35⅝	34½	35⅝	34½	6,020
Preferred	100	....	....	....	....	108	....	107½	107	106½	106½	107	106	1,487

Total sales, 1,000,482 shares

Mexico.

March 3.

Company.	Shares Issued.	Prices, Mex. Bid.	Prices, Mex. Ask.	Company.	Shares Issued.	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO:				San Rafael y An., aviada	1,200	$730	$740
Penoles	2,500	$2,600	$3,000	Soledad, aviada	670	1,260	1,270
San Andres de la Sierra	200	10,000	.....	Sorpresa, aviada	960	310	315
GUANAJUATO:				MEXICO.			
Cinco Senores y An. aviadoras	2,000	15	20	Aldebarren	2,000	16	20
Cinco, Senores y An. aviada	400	32	40	Buen Despacho	3,000	40	48
Providencia, San Juan de la Luz	6,000	155	160	Dos Estrellas	3,000	3,440	3,490
GUERRERO:				La Esperanza (El Oro)	3,000	1,500	1,500
Garduno y Anexas	7,200	31	35	Santa Ana, Esperanza	2,400	15	30
HIDALGO:				NUEVO LEON:			
Amistad y Con	9,600	70	74	La Fraternal	1,000	580	620
Carmen, aviada	1,100	215	230	Norias de Bajan	1,000	700	750
Guadalupe Fresnillo. Mill	1,000	170	200	SAN LUIS POTOSI:			
Guadalupe Fresnillo Mine	1,400	70	80	Concepcion y An	3,000	20	30
Maravillas y An., aviador	1,680	90	110	El Barreno, aviadora	2,000	92	98
Maravillas el Lobo	1,000	130	180	Sta. Maria de la Paz	9,600	289	290
Refugio, aviada	12,800	5	7	ZACATECAS:			
Sta. Gertrudis y An aviadas	9,600	7	10	Asturiana y An	2,500	8	12
Sta. Gertrudis y An., aviadora	28,800	73	76	Candelaria y Pinos	2,500	45	60
San Rafael y An., Trompillo	1,200	2,130	2,150	San Carlos y Annexas	2,500	15	20
				Sta. Maria de Gaud	2,500	80	90
				MISCELLANEOUS:			
				Bartolome de Medina	2,000	82	87
				Naica (Chihuahua)	100	11,000	13,000
				Natividad (Oxaca) aviadora	1,800	650	750
				San Francisco Hac	6,000	89	91
				Union Hacienda	3,000	320	340

Paris.

Feb. 23.

Company.	Location.	Par value.	Latest dividend.	Prices. Opening.	Prices. Closing.
		Fr.	Fr.	Fr.	Fr.
Acieries de Creusot	France	2,000	75.00	1.880.00	1.875.00
Anzin, Coal	France	.....	290.00	5.710.00	5.750.00
Biache-St. Vaast	France	1,000	160.00	3.605.00	3.605.00
Boleo, c	Lower California	500	104.17	2.750.00	2.730.00
Bruay, Coal	France	400	27.50	713.00	735.00
Courrieres, Coal	France	500	110.00	2 899.00	2.905.00
Escombrera-Bleyberg, z. l.	France	350	35.00	714.00	715.00
Huanchaca, s.	Bolivia	125	2.50	93.75	89.25
Laurium, z. l.	Greece	500	25.00	332.00	335.00
Malfidano, z.	Italy	500	50.00	644.00	638.00
Metaux, Cie. Fran. de.	France	500	22.50	537.00	530.00
Mokta-el-Hadid, i. l.	Algeria	500	40.00	1.040 00	1.035.00
Nickel, n.	N. Caledonia	250	22.50	669.00	669.00
Penarroya, Coal	Spain	500	45.00	1.190.00	1.165.00
Vielle Montagne, z.	Belgium	30	30.00	845.00	850.00

London.

March 2.

Company.	Par Val.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:	£	s. d.		£ s. d.	£ s. d.
*Alaska Treadwell	5	0 6 0	Feb., 1905	6 11 3	6 13 9
Anaconda	5	0 2 0	Nov. 1904	5 10 0	5 12 6
Camp Bird	1	0 9	Feb., 1905	1 13 9	1 16 3
Copiapo	2	0 5 0	Oct., 1904	1 8 9	1 11 3
De Lamar	1	0 2 0	Nov., 1904	16 3	18 9
El Oro	1	0 9	July, 1904	1 1 3	1 3 9
Frontino & Bolivia	1	0 rts.	Mar., 1904	15 6	16 6
Le Roi	5	0 5 0	Nov., 1899	13 9	16 3
Le Roi No. 2	5	0 2 0	Jan., 1905	16 3	18 9
Mesquital	1	0 3	Feb., 1903	2 3	2 9
Montana	1	0 6	Apr., 1899	6	1 0
Palmarejo & Mex	1	0 3	Nov., 1904	13 6	14 6
Stratton's Indep'd	1	0 6	Feb., 1905	9 3	9 9
St. John del Rey	1	0 6	Dec., 1904	11 6	12 6
Tomboy	1	0 1 0	Dec., 1904	1 5 0	1 7 6
Tyee	1	0 2 0	Dec., 1904	2 2 6	2 5 0
Utah, Con	1	0 6 0	Jan., 1905	8 7 6	8 12 6
Ymir	1	0 1 0	Mar., 1902	2 6	5 0
European:					
Libiola	5	0 1 6	May, 1904	1 11 3	1 13 9
Linares	3	0 5 0	Sept., 1904	4 0 0	4 10 0
Mason & Barry	1	0 7 0	May, 1904	2 18 9	3 2 6
Rio Tinto	5	0 32 6	Nov., 1904	65 10 0	65 15 0
Rio Tinto, pf	5	0 2 6	Nov., 1904	6 2 6	6 7 6
Tharsis	2	0 7 0	May, 1904	6 3 9	6 6 3
West Australian:					
Associated	1	0 2 6	July, 1904	1 15 9	1 16 11
Cosmopolitan	1	0 1 0	Apr., 1904	5 0	5 6
Golden Horseshoe	5	0 6 0	Nov., 1904	6 13 9	6 16 3
Great Boulder	..	2 9	Mar., 1905	1 1 6	1 2 0
Gt. Boulder Perse	1	0 9	Mar. 1905	12 0	12 6
Great Fingall	1	0 7 6	Jan., 1905	8 1 3	8 3 9
Ivanhoe	5	0 5 0	Jan., 1905	7 18 9	8 1 3
Kalgurli	1	0 2 6	Jan., 1905	7 3 9	7 6 3
Lake View	1	0 1 6	Oct., 1904	1 1 3	1 2 6
Oroya-Brownhill	1	0 4 0	Mar., 1905	3 12 6	3 13 9
Miscellaneous:					
*Brilliant Central	1	0 6	Mar., 1905	17 6	1 0 0
*Brilliant & St. Geo.		10 6	Mar., 1905	1 0 0	1 1 3
Briseis Tin	1	0		10 6	11 6
*Broken Hill		8 1 6	Feb., 1905	2 2 0	2 3 0
Mt. Lyell	3	0 1 3	Dec., 1904	16 0	17 0
Mt. Morgan	1	0 3	Mar., 1905	2 12 6	2 17 6
Waihi	1	0 2 6	Mar., 1905	6 13 9	6 16 3
Indian:					
Champion Reef		10 1 5	Jan. 1905	1 13 0	1 14 0
Mysore		10 5 6	Mar., 1905	6 17 6	7 0 0
*Nundydroog		10 1 6	Mar., 1905	1 8 9	1 11 3
Ooregum		10 9	Dec., 1904	18 6	19 6
Ooregum, pf		10 9	Dec., 1904	1 6 3	1 8 9
South African:					
Angelo	1	0 5 0	Feb., 1905	6 15 0	6 17 6
Bonanza	1	0 7 0	Feb., 1905	1 0 0	1 2 6
British So. Africa	1	0 rts.	May, 1899	1 15 9	1 16 11
Cape Copper	2	0 6	Jan. 1905	4 5 0	4 7 6
Cape Copper, pf	2	0 6	Jan., 1905	3 15 0	4 0 0
City & Suburban	4	0 6 0	Feb., 1905	5 12 6	5 17 6
Consol. Gold-F'lds	1	0 2 6	Dec., 1904	7 18 9	8 0 0
Crown Reef	1	0 18 0	Nov., 1904	15 5 0	15 15 0
De Beers, preferred	2	10 10 0	Feb., 1905	18 7 6	18 10 0
De Beers, deferred	2	10 2 0	Feb., 1905	18 0 0	18 2 6
*East Rand	1	0 4 0	Feb., 1905	8 11 3	8 13 9
Ferreira	1	0 27 6	Feb., 1905	22 10 0	23 0 0
Geldenhuis	1	0 5 0	Feb., 1905	5 3 9	5 6 3
Geduld	1	0 rts.	Mar., 1902	7 3 9	7 5 0
Henry Nourse	1	0 8 0	Feb., 1905	7 15 0	8 0 0
Heriot	1	0 5 0	Sept., 1899	3 17 6	4 2 6
Jubilee	1	0 5 0	Feb., 1905	3 12 6	3 17 6
Jumpers	1	0 2 6	May, 1904	2 2 6	2 7 6
Knights	1	0		6 0 0	6 2 6
Langlaagte	1	0 2 0	Feb., 1905	3 10 0	3 12 6
May	1	0 4 0	Feb., 1905	3 18 9	4 1 3
Meyer & Charlton	1	0 5 0	Feb., 1905	5 0 0	5 5 0
Modderfontein	1	0 rts.	Apr., 1902	10 15 0	10 17 6
Namaqua	2	0 3 0	Dec., 1904	3 15 0	3 17 6
New Goch	1	0		3 2 6	3 5 0
New Kleinfontein	1	0 rts.	Apr., 1902	2 6 3	2 8 9
*New Primrose	1	0 3 0	Feb., 1905	3 2 6	3 5 0
Rand		5 5 0	Aug. 1904	11 1 3	11 3 9
Randfontein	1	0 rts.	Apr., 1899	3 0 0	3 1 3
Robinson	5	0 8 0	Feb., 1905	9 12 6	9 17 6
Robinson Deep	1	0 3 0	Aug., 1904	6 8 9	6 11 3
Rose Deep	1	0 3 0	Feb., 1905	8 2 6	8 7 6
Salisbury	1	0 2 0	Jan. 1905	1 10 0	1 15 0
Sheba	1	0 rts.	Feb., 1904	8 6	9 0
Simmer & Jack	1	0 6	Aug., 1904	2 2 6	2 3 9
Village Main Reef	1	0 4 0	Jan., 1905	6 7 6	6 12 6
Wemmer	1	0 12 6	Dec., 1904	8 15 0	9 5 0

*Ex-dividend.

Ishpeming, Mich.*

Week, March 11.

COMPANY.	Par Val.	High.	Low.	Last Sale.
Black Mountain ($2 paid)	$5	$2.30	$2.25	$2.25
Black Mountain (Full paid)	5	4.75	4.75	4.75
Calumet & Arizona	10	110.50	108.00	110.00
Calumet & Pittsburg	10	45.50	44.00	44.00
Junction Dev. ($11 paid)	15	107.50	103.50	107.00
Lake Superior & Arizona	10	10.00	9.00	9.87½
Lake Superior & Pittsburg	10	49.50	50.00	50.00
Pittsburg & Duluth ($8 paid)	15	30.25	29.00	29.00
Pittsburg & Duluth (Full paid)	15	32.25	31.00	31.00
Wolverine & Arizona	10	5.50	4.50	4.50

*By The Wallace H. Hopkins Co.

Questions and Answers.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Chalk.—Do you know of any scientific text-book that treats of chalk, its occurrence, production and industrial value?—L. W.

Answer.—References to chalk (earthy calcium carbonate) will be found in the various text-books on minerals, especially in Wagner's 'Chemical Technology' and Merrill's 'Non-Metallic Minerals.' A special treatise is not obtainable. Chalk is widely distributed in Europe, notably in England and France; but America has yet to develop a remunerative industry, although it is a large consumer. As a fertilizer chalk (either crude or burnt) is finding a good demand; also in the manufacture of whiting, and crayons. Precipitated chalk is imported largely from England, and is sold in New York at 4c. per lb.; it is employed as a filler in wall paper, as a whitewash for ceilings, a polishing powder for metals, and for various other minor purposes. Lump chalk of good quality is marketed in New York at about $3 per short ton, a price that is made up largely of the cost of ocean freight from England. Before inaugurating work on your property we would advise you to send a sample of the chalk to the Atlas Whiting Manufacturing Company, Philadelphia, Pa., and to Charles E. Currie & Co., Pensacola, Florida.

Recent Legal Decisions.

SPECIALLY REPORTED.

PENNSYLVANIA MINERS' CERTIFICATE LAW.—In the case of the Commonwealth v. John Shaleen, defendant was brought to trial for working in the mines of the Delaware & Hudson Company without the certificate required by law. The jury in the case, by agreement, found a verdict of guilty, and the case was taken to the district court on certain questions of law. This was regarded as a test case, and was fully argued by counsel for the Delaware & Hudson Company, who appeared nominally for the defendant, Shaleen. The decision of the court upholds the constitutionality of the law. The points in the decision of Judge Kelly, before whom the case was tried, are given below:

The defense raised the question that the act called for two years' experience as a miner, and did not say in what kind of mines. Therefore they claimed that the act could not be made to apply. Judge Kelly disposes of this objection by saying that a strict construction of the act would lead to unreasonable, unjust and absurd results. He says that the court must presume that the Legislature meant to accomplish the result for which the act was passed: "to protect those employed in the anthracite coal mines."

The court holds that the act does not constitute an unreasonable exercise of the police powers of the State. "It is," he says, "legislation upon the subject of anthracite coal mines, and the Legislature has full power to regulate the business of mining anthracite coal. Such legislation is within the valid exercise of the police power of the State."

The defense claimed that the act was against Section 1 of the fourteenth amendment to the Constitution, which provides that no State shall make or enforce any law that will abridge the privileges and immunities of citizens of the United States, nor shall any State deprive any person of life, liberty, or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Judge Kelly declares that the act is in conformity with this section of the Constitution. He says that it does not discriminate against any citizen of any State, but that it applies to all citizens of all States alike. "A citizen of Pennsylvania can no more qualify to work as a miner without having first had two years' experience in the mines of this Commonwealth than a citizen of any other State."

The court says that even if Shaleen were a citizen of the State, without having the necessary experience, he would be no better off than he is now.

Further, the court says: "It is true that a man has the right to work as and where he pleases, and to contract for labor as he chooses, as contended by defendant's counsel, but this right is subject to certain limitations which the State may lawfully impose, in the exercise of its police powers, to legislate for the protection of life and limb, as well as for the health and morals of the citizens of the State."

Going further in this subject, the court says: "It has been held that a statute limiting the period of employment of workmen in underground mines to eight hours was a valid exercise of the police powers of the State."

In closing the opinion, Judge Kelly says: "We have given the case full consideration and have come to the conclusion that the act is good and valid as a reasonable regulation under the police powers of the State, and that its provisions are not in conflict with the provisions of the Constitution of the United States."

THE TESLA PATENTS IN THE SYNCHRONOUS MOTOR SUITS.—In pursuance of a decision handed down by him on February 20, in the United States Circuit Court for the Eastern District of Wisconsin, sustaining the contention of the Westinghouse Electric & Manufacturing Company that the synchronous motors of the National Electric Company were an infringement of the broad rights covered in Tesla patents No. 381,968, No. 381,969, No. 382,280 and No. 382,281, Judge Seaman, in Milwaukee, Feb. 24, enjoined the National company from the further sale of such motors. The decision is the first that has been obtained in the litigation begun some time ago by the Westinghouse company to prevent the sale of synchronous motors and rotary converters by American manufacturers not enjoying licenses under the Tesla polyphase motor patents. A decision is now pending in the United States Circuit Court for the Southern District of Ohio in the suit brought by the Westinghouse company against the Bullock Electric Manufacturing Company, alleging similar infringement of the same patent rights in the sale of Bullock synchronous motors and rotary converters. The final hearing in the latter suit was conducted before Judge Thompson, in Cincinnati, on Feb. 7 and 8.

The Tesla patents involved in these suits have been the subject of considerable litigation in the past few years. The action instituted by the Westinghouse company a number of years ago against the Thomson-Houston Company, for alleged infringement of the Tesla patents, was discontinued upon the execution of a patent agreement under which the General Electric Company has for several years manufactured and sold induction and synchronous motors and rotary converters. A number of manufacturers have been enjoined from manufacturing induction motors, but the decision in the suit against the National Electric Company is the first court ruling that the synchronous motor is within the generic Tesla invention. Judge Seaman's decision is, in part, as follows:

"The defendant's contentions are, in substance, that the Tesla invention, embodied in each of the patents, is the rotating field mode of operation, which is 'the production of the conjoint effect, out of phase currents, of a progressive shifting by the polarity,' and is thus 'identical in its effect with that of a rotating physical magnet'; that it is limited to a self-starting motor so operated, and that, both by the terms of the patents and the state of the art, the defendant's synchronous motor with direct current excitation is not within the invention; that the defendant's synchronous motor is simply a reversed 'two-phase alternating current dynamo of the prior art used as a generator,' adapted to alternative use; and that the claims of patents 381,969 and 382,281, which bring in 'direct current excitation producing synchronous operation,' must be limited to such use 'after the motor is started by the Tesla means and method and is brought up to speed.' If the invention is so limited by the prior art, it is plain that the defendant escapes infringement. On the other hand, if not so restricted, it is equally

clear that the claims of the patents are broad enough to reach the defendant's means and method of operation.

"The Tesla discovery, for which these patents were granted, revolutionized the art of electrical power transmission, as is well demonstrated in the record from both judicial and scientific standpoints. Judge Townsend's definition in reference to the generic patents in the New England Granite case, repeatedly approved by other courts, is adopted for this consideration, namely: 'Tesla's invention, considered in its essence, was the production of a continually rotating or whirling field of magnetic forces, for power purposes, by generating two or more displaced or different phases of the alternating current, transmitting such phases, with their independence preserved, to the motor, and utilizing the displaced phases as such in the motor.' So viewed, the patent monopoly was rightly granted for its brief term to the use of the means and methods thus discovered. While it could not exclude the known uses of the prior art, it is surely entitled to be protected against like motor structure and mode of operation, not clearly disclosed in the prior art, and the patent claims to that end must be fairly construed in conformity with the rule applicable to such inventions. I am of the opinion, therefore, that the several contentions for the defendant are either without force or untenable for the following reasons:

"Whether the effect of the Tesla invention in its production of the 'whirling field of magnetic force' is identical with that of a rotating physical magnet, as argued by experts and counsel, does not impress me as material to this issue. Nor does it seem material that in the one form of motor 'the rotation is produced by the unaided effect of alternating, out-of-phase currents,' as described by counsel, and that, so applied, a self-starting motor is obtained. The discovery was one of means and method in the polyphase rotating-field motor to produce the whirling field of force, and employment thereof was patentable with or without direct current excitation of the armature or secondary element. So the fact that its use produced a self-starting motor without the aid of such excitation cannot alone serve to limit the invention to that effect, and I find no such limitation in the terms of the patent. The quotations from the arguments of counsel and experts for the complainant in prior cases, urging the distinction of this self-starting effect in reference to the application of the generic patents to non-synchronous motors, are without force in the present controversy, and it is unnecessary to ascertain their consistency or inconsistency with the interpretation sought on this hearing. Unless limitation to self-starting motors arises out of the prior art, none can be imposed upon the claims in suit.

"The further propositions urged by way of defense—aside from the defense founded upon prior inventions of the synchronous type to be considered—are these: (1) That the synchronous motor of the defendant is the old generator of the art, simply reversed; and (2) that the Tesla invention is not present therein, because (as asserted) 'the preponderating magnetization' of the direct current displaces and obliterates the 'shifting alternating current magnetization,' or Tesla's 'whirling field of force.' However specious both propositions appear on their face and in the argument, neither of them impresses me as controlling.

"My conclusions are that the defendant's synchronous motor structure and operation are within the generic invention as patented, and expressly covered by the claims of Nos. 381,969 and 382,281; that the invention is utilized in the defendant's motor operation, notwithstanding the introduction of direct current excitation to make it synchronous, in lieu of the full realization of the revolving field effect for self-starting; that such supplemental aid does not escape infringement, with or without advantage in such associations; and that, in any view, the combination patents referred to are not limited to after-effect of the direct current excitation, but apply to the defendant's combination. Decree will be entered accordingly, as prayed in the bill."

Abstracts of Official Reports.

Adventure Consolidated Copper Company.

This Michigan company's property is situated in the southern extension of the Keweenaw copper range. The report covers the calendar year 1904.

Development has been pushed actively, and has comprised, during the year, 5,355 ft. of drifts and cross-cuts, and 310 ft. of shaft and winze. Stoping has been confined to two lodes, while a third—the same lode that a neighboring mine has found valuable—is being explored. Stoping amounted to 6,520 cubic fathoms.

The mill is being altered with a view to increased economy and efficiency, a Cochrane feed-water heater being the principal addition. The mill treated 97,036 tons of ore and gave 1,116 tons of concentrate, carrying 1,380,480 lb. of copper.

The operations for the year may be stated thus:

Sale of product	$188,149
Operating expenses	$241,332
Michigan taxes	11,132
Smelting, transportation, etc.	25,789
Construction account	1,929
Total expenses	$280,182
Deficit for the year	$92,033
Balance brought forward	128,588
	$36,555
Installment of capital paid in 1904	50,000
Balance on hand	$86,555

The company is capitalized at $2,500,000, the maximum limit allowed by the Michigan laws.

The Holthoff Revolving-Hearth Roasting Furnace.

The development in late years of so many mining properties containing large quantities of comparatively low-grade and refractory ores has created a demand for a furnace of large capacity, in which such ores can be roasted preparatory to chemical or further igneous treatment. Heap and stall roasting and the hand reverberatory roasting furnaces have, largely, made way for furnaces in which the ore is stirred or rabbled by mechanical means. The designs of the first mechanical roasting furnaces followed closely along the lines of the hand reverberatories, but later designs have been, in nearly every instance, furnaces having a round hearth and revolving rabbles. In the Holthoff revolving hearth furnaces, the design of Henry C. Holthoff, of Milwaukee, this principle is reversed. The hearth, which is annular in form, is made to revolve about a centrally located gas producer. The wall of this producer forms the inner wall of the roasting chamber and the support for its arched roof, while the outer wall is supported on cast-iron columns or structural steel.

The gas generated in the producer enters the roasting chamber through a number of pipe channels radially disposed in the walls of the producer. Air-pipes are also located in the walls of the producer, the lower ends opening to the atmosphere through a regulating valve, the upper ends extending into the roasting chamber in close proximity to the gas exits. The air, heated in its passage through the producer walls, mixes with the gas upon entrance to the roasting chamber and combustion is spontaneous. The flame, traveling radially across the hearth, finally discharges through a series of tile pipes into a large circular smoke-flue supported on a steel framework, just above and around the outer edge of the furnace. It will be noted that, while the hearth revolves, the main furnace structure is stationary.

The rabble arms, of which there are four sets, extend down through the arched roof of the roasting chamber and all cooling water connections, and adjustment of the angularity of the rabble blades is accomplished outside of the furnace. The rabble arms consist each of two pieces of cast-iron pipe of different diameters, one within the other, the outer pipe being tapped into the hollow rabble blade. This arrangement is a simple and effective means for water-cooling the rabbles.

The ore, fed through a feeder having an adjustable eccentric and a spiral conveyor extending through the outer wall of the furnace, drops upon the outer edge of the hearth, and, as the hearth revolves, is rabbled across in a spiral path.

Reaching the inner curb of the revolving hearth, it drops through discharge spouts upon the inner edge of the stationary cooling floor located directly under the revolving hearth. It is then moved across the cooling hearth, and finally discharges at the outer edge of the cooling floor into a revolving hopper or to a belt-conveyor or elevator. The hearth revolves upon equalizing roller bearings of conical form and is revolved by means of a roller rack and a pinion.

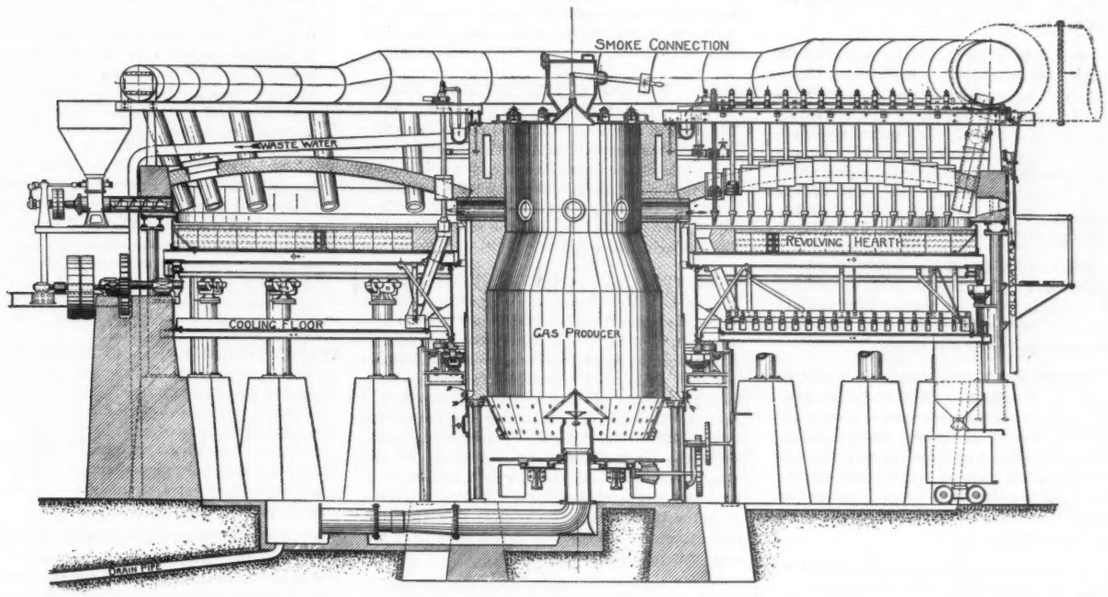
From the inside of the mantel upon which the outer wall rests, a steel metal apron is hung, extending down inside the outer curb of the hearth, and, the top of the ore-bed being higher than the bottom of this apron, the opening between the hearth and the wall of the roasting chamber is effectually sealed against the entrance of cold air. By means of valves or dampers located in the air inlet and smoke-discharge pipes, the temperature in the roasting chamber is under complete control of the operator at all times, and, as the angularity of the rabble blades can be changed quickly and easily, the time the ore remains in the furnace is also under complete control. The angularity of all the rabbles of one set is changed by the movement of a lever conveniently located for the operator, and which slides in a quadrant on which are figures indicating the degree of angularity of the rabbles.

The furnace described was designed especially for treatment of low-sulphur ores, such as are found in the Cripple Creek district, and was built about a year ago for the Portland Gold Mining Company's mill, at Colorado City. In a two months' test run of this furnace the following results were obtained, the figures given showing the average per day of 24 hours during the entire test: Raw ore charged, 99.82 tons; sulphur in raw ore, 2.572%; sulphur in roasted ore (sulphides), 0.142%; coal consumed, 9.45 tons; coal per ton of ore charged, 189.80 pounds.

These furnaces are also built in three other types, one similar to that described above, except that a plain fire-box is substituted for the gas producer. Another type, designed for roasting sulphide ores preparatory to smelting, is built along the same general lines, except that the cooling floor is omitted and the roasted ore discharges automatically into a stationary receiving hopper, from which the calcine is drawn off into cars and taken to the smelting furnace.

The fourth type of furnace is designed for roasting high-sulphur pyritic ores. In this type of Holthoff furnace the cooling floor is omitted and a plain fire-box is substituted for the gas producer. This fire-box, however, is used only to ignite the sulphur in the charge. After ignition the sulphur burns spontaneously and the fire-box is used merely as an air-flue.

The advantages claimed by the builders of these furnaces, the Power and Mining Machinery Company, at Cudahy, Wisconsin, are: (1) Great capacity. (2) Ability to control the temperature in the roasting chamber as well as the rate at which the ore is moved across the hearth, thus giving the operator complete control of the roast during the entire operation. (3) By using a gas producer incorporated in the furnace structure, no heat is wasted in piping and the expense of installation and repairs for piping is eliminated. Also by generating gas in the producer, the combustion of which takes place in a roasting chamber, the greatest possible utility is made of the heating value of the fuel. (4) The small amount of manual labor connected with the use of these furnaces is an important item. The only labor required is for lubricating and such general attention as is due any piece of machinery, and one man can attend several of these furnaces. (5) Throughout the general construction of these furnaces provision is made for expansion and contraction of the various parts to save annoyance and expense of repairs from this cause.



HOLTHOFF REVOLVING-HEARTH ROASTING FURNACE.

Serpentine asbestos, being measurably attacked by acids, is suitable for making into board and paper, while it is the more resistant hornblende asbestos which is useful for chemical processes, as in the contact-process for sulphuric acid.

Patents Relating to Mining and Metallurgy.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by THE ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending February 28, 1905.

783,435. RETORT FOR THE MANUFACTURE OF GAS.—Gustav Horn, Braunschweig, Germany. The combination of a furnace, retorts therein, channels in said retorts at the top and bottom thereof, walls formed of plates provided with ribs and arranged in steps between the channels and the interior of the retort.

783,438. MACHINE FOR CUTTING MICANITE OR THE LIKE.—Edwin G. Kastenhuber, Schenectady, N. Y., assignor to General Electric Company, a Corporation of New York. The combination of a main frame, a cutter-head pivoted thereon, a horizontally and vertically adjustable work-table, and means for adjusting said head in unison with the horizontal adjustment of the table.

783,442. BRICK-MAKING MACHINE.—Thomas S. Lawrence, Kansas City, Mo. The combination with a suitable frame of stationary dies, a mold-plate and a mold for the material, material-compressing mechanism for compressing the material in the mold, and a motor, motor-operated mold-lifting devices for raising said mold from the mold-plate, and means for transferring the power from the motor, actuating the material-compressing mechanism to the motor operating the mold-lifting devices when the desired pressure is reached upon the material in the mold.

783,448. BUILDING BLOCK.—Alfred H. Merrill, Toledo, Ohio. A building-block comprising side walls, end walls and an arched member integral with said walls, the arch springing from near the bottom of the inner sides of two opposing walls, the top of the arch being flush with the plane of the top of the block.

783,451. MOLD FOR THE MANUFACTURE OF BUILDING-BLOCKS.—Eugene Morenus. Cleveland, N. Y. In a mold of the character described, displaceable side walls, a core carried by the side walls and extending across the space between them forming spaced pockets, and end walls bridging the space between the side walls, said end walls constituting the ends of the pockets and abutting against the ends of the core throughout the width of said pockets.

783,452. BUILDING-BLOCK.—Eugene Morenus, Cleveland, N. Y. A building-block comprising spaced members that have thicker intermediate portions, said members tapering from the intermediate portions to opposite edges.

783,455. FLUID-FUEL BURNER.—Frederick L. McGahan, St. Louis, Mo. A fluid-fuel burner provided with a central air-passage, means for regulating the flow of air through said passage, a fuel-storage chamber surrounding said air-passage, a downwardly inclined burning-surface surrounding said fuel-chamber, and a passage for conducting the fuel from said fuel-chamber to said burning-surface.

783,524. PROCESS OF MAKING CREAM OF TARTAR.—George W. Hooven, Englewood, N. J., and Samuel T. H. K. Endemann, Brooklyn, N. Y., assignors to California Products Company, Jersey City, N. J. The process of producing cream of tartar from pomace, which consists in drying the pomace to prevent destructive fermentation, then in treating the pomace with a solution of oxalic acid in hot water and in drawing off and evaporating the resulting liquor.

783,534. PROCESS OF MANUFACTURING STONE OR BRICK.—Albert L. Munson, New York, N. Y. The composition consists of sand, lime and tannic acid.

783,535. SMELTING FURNACE.—Michael Murphy, Pueblo, Colo., assignor of one-half to Fred W. Lucco, Pueblo, Colo. A smelting furnace having a transverse air-passage below the ore-bed and just in rear of the bridge-wall, the ends of which extend through the side walls of the furnace and communicate with the outer air, and a series of longitudinal air-passages beneath the ore-bed communicating at their front ends with the transverse air-passage and having their rear ends communicating with the outer air.

783,539. BUILDING CONSTRUCTION.—Emile G. Perrot, Philadelphia, Pa. Reinforcing means for a cementitious body, comprising longitudinal main bars or members formed of metallic structural elements, longitudinally extending plates connecting said elements, and transverse minor elements attached to said longitudinally extending bars at points where the same are not connected by said longitudinal plates.

783,570. PROCESS OF TREATING LIME.—Carleton Ellis, Boston, and Harry B. Chalmers, Dedham, Mass. The process consists in completely hydrating quicklime to a dry pulverulent condition with a dilute solution of a metallic salt capable of forming an insoluble oxychloride with the lime.

783,571. CLEANING AND SEPARATING MACHINE.—Charles Fricke, San Francisco, Cal., assignor of one-half to Oscar T. Weber, San Francisco, Cal. In combination with a cleaning-machine, an exhaust-chamber, legs depending therefrom, an inclined shaking bed beneath said legs having openings therein near the legs, a pressure-pipe connected with said openings, and a perforated inclined bed for receiving the material from said shaking bed.

783,576. COMBINATION METAL MOLD FOR BRASS CASTINGS.—Frank Haggenjos, St. Louis, Mo. In a metal mold for brass castings, the combination in a sectional iron mold, perforated and provided in each section with seatings containing hard-sand fillings, which form the back and bearing sides of the casting-cavity, and provided with a horn gate-passage to the bottom of mold-cavity, and bolting-lugs to secure the parts to the clamping-jaws arranged to hold groups of molds.

783,577. MOLD FOR MAKING BRASS CASTINGS.—Frank Haggenjos, St. Louis, Mo. Combination of a central iron mold-section provided with the hard-sand fillings for the back and bearing walls of the casting-cavity, the said fillings held in their seatings and protected by cages secured to the said central section, and provided with gate-openings through the said fillings into the cavity of the mold.

783,600. PROCESS OF EXTRACTING COPPER FROM ORES.—George H. Waterbury, Denver, Colo., assignor to The Waterbury Metals Extraction Company, Spokane, Wash. A process of extracting copper from ore, consisting in placing the suitably pulverized ore in a solution composed of water saturated with sulphurous acid and containing a comparatively small quantity of sulphuric acid, subjecting the mass to agitation until the copper is dissolved, drawing off the solution containing the copper and placing it in a receptacle containing metal sufficiently divided to allow the solution to circulate therethrough, and subjecting the solution to agitation until the copper is precipitated.

783,619 APPARATUS FOR TREATING SALT.—Herbert C. Coward, Oakland, Cal., assignor to California Salt Company, a corporation of California. In an apparatus for producing salt in granular form, a drier, a set of grinding-rolls, a blower whose inlet-pipe enters the casing of said rolls, a screen, a casing inclosing the same, an elevator for conveying material from said grinding-rolls to said screen, a pipe leading from said screen-casing to a suction-blower, and a discharge spout from said screen to a final receptacle.

783,624. APPARATUS FOR MAKING ARTIFICIAL FUEL BY DISTILLATION.—John T. Davis, San Francisco, Cal. A distillation device comprising, in combination, a passage with a lower portion open at both ends; said passage having a confined upper vapor-space, a feed-inlet, a discharge-outlet, and vapor-exits; means for moving material through the passage; heating means; and means for cooling the residuum of distillation.

783,637. COAL-COMPRESSING AND CHARGING DEVICE.—James B. Ladd, Wayne, Pa., assignor to The Semet-Solvay Company, a corporation of Pennsylvania. In combination with a coal-compression box, having coöperating oppositely acting and horizontally movable sides, independently movable, power-operated mechanism for filling said box with coal and automatically striking the surplus coal from the top thereof.

783,638. ROCK-DRILLING ENGINE.—John G. Leyner, Denver, Colo. A fluid-pressure drill, comprising a cylinder, a piston having a longitudinal bore, a hollow tool, a water-supply pipe extending into the bore of said piston, and means independent of said piston for rotating said tool.

783,646. ACETYLENE GAS GENERATOR.—Victor E. Peterson, Denver, Colo. The combination with a generator having a water-inlet, of a gasometer having a bell therein and provided with a water-reservoir on the exterior thereof, said reservoir having an outlet, a tilting feed-pipe eccentrically pivoted in juxtaposition to said reservoir and provided upon its longer arm with a discharge-nozzle, means connected to the shorter arm of said feed-pipe to normally hold the same in an inclined position with its nozzle disposed above the level of the water in the tank, a flexible pipe connecting the shorter arm of said pipe with the outlet of the reservoir, and means upon the bell of the gasometer to engage the longer arm of said feed-pipe and hold the said pipe downward when the bell is in lowered position, to adapt the same to feed water to the said water-inlet of the generator.

783,732. ACETYLENE GAS GENERATOR.—Algernon S. Phelps, Jr., Chicago, Ill. The combination, with a generator-tank and a carbide magazine, of an annular gasometer-bell mounted in operative relation to the generator-tank and surrounding the magazine, and means passing through the space between the magazine and the gasometer-bell and adapted to operate carbide-feeding mechanism.

783,736. ELECTRIC FURNACE.—George O. Seward, Holcombs Rock, Va., assignor to the Willson Aluminum Company, New York, N. Y., a corporation of New York. The combination with an electric furnace cover, through which an electrode passes, of a separate lid forming a complete ring around the electrode for holding the same in position, said lid having a passage for the circulation of cooling-water.

783,767. MOLD FOR CONCRETE WALLS.—Olof E. Wennberg, Chicago, Ill. A mold comprising side pieces, angled hook members each having a perforated portion and the remaining portion of each hook member having a reduced end, one of said hook members being adapted to support the side pieces and the other being adapted to rest transversely across the upper edges of the said members.

783,771. CONVEYER.—Charles H. Anderson, Chicago, Ill. A conveyer-section, belt-pulleys on said section, a drive-shaft for one said pulley, and operating means therefor comprising a separately portable electric motor having a shaft and means for readily connecting together and disconnecting said shafts.

783,778. FURNACE-ARCH.—George L. Davison and David R. Mathias, Chicago, Ill., assignors to Protected Furnace Port Co., Chicago, Ill., a corporation of Illinois. In an open-hearth furnace, the combination with the main chamber of upper and lower flues, leading into one end thereof, and a horizontally and transversely extending divisional arch separating said upper and lower flues at or near their point of entrance to the main chamber, said divisional arch comprising an upper layer of refractory material and an underlying transversely extending water-cooled structure, underlying and directly supporting substantially all parts of the refractory material of those portions of the divisional arch which form the point of conflux of said upper and lower flues.

783,783. APPARATUS FOR THE RECOVERY OF VOLATILE ACIDS FROM SOLUTIONS.—Edward R. Hewitt, Garden City, N. Y. An apparatus comprising a receptacle for the solution, an open-ended pipe extending into the receptacle near the bottom thereof, for the admission of live steam, and a curved condensing-chamber surrounding the open end of said pipe, whereby condensation of the steam is induced and the liquid in the receptacle is given a whirling motion.

783,790. GAS-ENRICHING MACHINE.—Charles S. Kline, Denver, Colo., assignor to Economy Patent Manufacturing Company, Denver, Colo., a corporation of Colorado. In a gas- or air-enriching machine, a tank adapted to contain a carbureting fluid provided with gas inlet and exhaust ports, and strips of redwood-bark in the tank intermediate, said inlet and exhaust ports extending down below the normal level of the liquid.

783,797. MAKING FIRE-BRICK.—Sheldon Norton, Watervliet, N. Y. Fireproofing material formed from tempered, granulated and powdered blast-furnace slag mixed with a small percentage of hydraulic cement and water, and hardened by the application of water.

783,810. ARTIFICIAL FUEL.—Henry R. Woltmann, Berkeley, Cal. An artificial fuel composed of a relatively low combustible vehicle, and a mixture of relatively higher combustibles consisting of crude petroleum and asphaltum, the petroleum and asphaltum being in approximately close relative proportions, and the relative proportions of said vehicle and mixture being approximately close.

783,820. ARTIFICIAL STONE MOLD.—John B. Clayton, Kirkwood, and Reno D. O. Johnson, St. Louis, Mo. A molding-core comprising two sections movable away from and toward each other, alining bosses carried by the sections and provided with interior threads, an expanding member having exterior threads engaging the threads in the bosses, and a flanged head carried by the expanding member and forming a part thereof, the flanges of the head comprising guides for guiding an expanding tool into engagement with said head.

783,844. EXPLOSIVE.—James C. Mitchell, Reynolds, Ind. An explosive powder comprising cane-sugar, sugar of milk, potassium chlorate, and the constituents of red sandalwood soluble in alcohol.

783,872. APPARATUS FOR GENERATING AND BURNING GASES FROM HYDROCARBONS.—John N. Leach, Melrose, Mass., assignor, by direct and mesne assignments, to National Oil Heating Company, a corporation of Maine. The combination of a primary burner and a secondary burner provided with separate mixing-chambers, a secondary-burner fuel-supply system comprising a vaporizer and a superheater formed of a continuous pipe and subjected respectively directly to the flame of said secondary burner and said primary burner, means whereby oil is fed to said vaporizer and means whereby vapor from said superheater is given an admixture of air and discharged into said secondary-burner mixing-chamber, a primary-burner fuel-supply system comprising an individual vaporizer, means whereby oil is fed thereto, and means whereby vapor from said vaporizer is given an admixture of air and discharged into the mixing-chamber of said primary burner.

783,880. APPARATUS FOR HEATING AND PURIFYING OIL.—James F. Malcom, Bluffton, Ind. An apparatus comprising an oil-tank to contain a body of liquid of greater specific gravity than oil in its lower portion, a plurality of steam-pipes terminating adjacent to the periphery of the tank and near its bottom, the ends of the pipes being pointed in such direction as to impart rotation to the liquid, and to cause any contained impurities to travel close to the walls of the tank, a suction-pipe extending coincident with the axis of rotation of the liquid, the suction end of the pipe being disposed adjacent to the lower portion of the tank, and the discharge end thereof being perforated and extending horizontally from the axial center of the tank to a point near the periphery thereof.

783,903. ORE FURNACE.—August Skoog, Shreveport, La. In a quicksilver-furnace, the combination with a plurality of vertically disposed alternately arranged fire and ore chambers, transverse partition in the fire-chambers, oppositely located fire-boxes, one for each fire-chamber, said fire-chambers having openings in their end walls through which the products of the fires are delivered in opposite directions, tiling arranged in the ore-chambers in staggered formation whereby a sinuous passage is provided for the ore, said tiling arranged to provide passages at the extreme ends of the chambers through which the products of combustion will travel upwardly, means for feeding material to the ore-chambers, and means for discharging the ore from said chambers.

783,905. BALL MILL.—Otto Soiné, Brunswick, Germany. A ball mill having a rotatable body which downwardly and outwardly flares to a horizontal rim, the latter being provided with radial partitions, a fixed rim with which the rim of the body coöperates, and a cover removably and fixedly held on the upper portion of the body and having its lower edge located inwardly at a distance from the upper edge of the fixed rim.

783,907. CONVEYER AND DISTRIBUTER.—Joseph W. Stevens, Trenton, N. J. The combination of a conveyer, means for mounting the same, means for swinging the conveyer in an arc, and means for automatically and simultaneously raising and lowering the same.

783,914. PROCESS OF MAKING BUILDING-PLASTER.—George Williams, Gary, Ill. A process of making building-plaster which consists in first calcining dolomite, and then treating the calcined product with steam from a solution of silicate of sodium.

783,928. MOLD FOR CONCRETE WALLS.—Preston H. Clingan, Florence, Colo. A mold, comprising a body portion bent into form with its edges meeting in a line transverse to the mold, a rotatable disk pivoted at one side of said body portion near its transverse meeting edges, links extending lengthwise of the mold, and pivoted at their inner ends to said disk and at their outer ends to the mold on opposite sides of its meeting edges.

783,931. ORE SEPARATOR.—James M. Couper, Atlanta, Ga. An inverted conical vessel having an outlet below its top, means for introducing pulp into the vessel tangentially thereof and above said outlet, a pipe leading from said outlet, and the delivery end of which is located substantially at the same level as that at which the pulp is introduced into said vessel, and means for catching gold, or the like, associated with the said vessel.

783,947. ACETYLENE GAS GENERATOR.—William A. Gribble, Collinsville, Tex. The combination of a generator having its upper portion reduced, a shell surrounding the upper portion of the generator and forming a liquid-chamber, a bell having its lower end received in the liquid-chamber aforesaid, a carbide-holder mounted in the upper portion of the generator, a valve controlling the feed of carbide from said holder, a service-pipe disposed transversely in the lower portion of the generator, a vertical supply-pipe leading from the gas-space of the generator into the service-pipe, a lever pivoted to the horizontal service-pipe in the generator, a rod connecting one end of the lever with the valve, a second rod connected at its lower end with the other end of the lever and having its upper end projected out of the generator alongside of the gas-bell, a guide-tube secured to the shell aforesaid and receiving the valve-rod near the bell, a guide-bar projected upwardly from the generator at the side opposite that upon which the last-mentioned valve-rod is disposed, guide members projected laterally from the upper portion of the bell and co-operating with the guide-bar and last-mentioned valve-rod to direct the movement of the bell, and a pin extended from the upper end portion of the last-mentioned valve-rod and adapted to be engaged by the adjacent guide member of the bell to effect actuation of the valve

783,960. MACHINE TO MAKE BRIQUETTES.—Charles D. Jenkins, Boston, Mass. The combination of two stationary side plates and a revoluble hub having bearings therein and provided with a series of radial transverse plates projecting therefrom and coacting with said side plates throughout the greater part of its revolution to form a plurality of compartments, a movable bottom to each compartment co-operating with said side plates and transverse plates to form a plurality of shallow pockets, means for forcing material into said pockets, a bed forming the outer wall of said pockets during compression, and means for ejecting the material from said pockets after compression.

783,970. DRIER.—Charles A. Matcham, Allentown, Pa. The combination in a drier, of an inclined drum, bearings at each end supporting said drum, an annular rack on the drum by which it is rotated, a furnace inclosing a portion only of said drum, a chamber with which the outlet end of the drum communicates, an outside flue extending from the furnace to the chamber, and a stock with which the inlet end of the flue communicates, so that the products will pass around a portion of the drum, then through the flue to the interior of the drum to the stack.

783,983. GAS ENGINE.—Charles E. Sargent, Chicago, Ill. In an internal-combustion engine, the combination with a combustion-cylinder having a valve-chamber, of a cylinder-valve lying in one part of the chamber and controlling the inlet and exhaust passages, an ignition device lying in another part of the chamber, and an independently movable puppet-valve for closing communication between the two parts of the chamber.

784,004. HOT SYSTEM ROLLING-MILL.—William Kent, Youngstown, Ohio assignor of one-half to Noah Kent, Struthers, Ohio. The combination of a set of rolls and two portable furnaces, one on each side thereof, having each two openings, whereby to feed the rolls from one, and at the same time take from the rolls into the other, said furnaces having means to retain and heat the metal in the intervals between passages through the rolls.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending February 11, 1905.

1,556 of 1904. NICKEL ORE TREATMENT.—M. Malzac, Paris. Dissolving nickel from silicate ores by heating them with strong acid and then lixiviating.

6,021 of 1904. STEEL FOR CRUSHERS.—S. Osborn, Sheffield. Making the crushing-surfaces of jaw-breakers of ribs of special steel, such as tungsten, or manganese steel.

7,056 of 1904. METALLIC SODIUM.—E. A. Ashcroft, London. Improvements in the inventor's process for producing metallic sodium from a fused salt of the metal.

7,500 of 1904. LIFTING-JACK.—J. R. Hunter, Wilkesbarre, Pa. An improved lifting-jack for placing mine timbers in position.

7,658 of 1904. GOLD PRECIPITATING BOXES.—R. Kunicke, London. Improvements in precipitating boxes for gold solutions, whereby the order in which the solution is pumped through a series is readily changed.

14,213 of 1904. BINDER FOR BRIQUETTING COAL.—W. Simpkin and J. B. Ballantine, London. The use of albuminous matter, such as blood, as a binding agent for fine coal and ores.

19,141 of 1904. CONCENTRATING APPARATUS.—E. J. Swyny and S. G. Plucknett, Sydney, N.S.W. An improved vibrating settling tank for concentrating fine ores.

24,175 of 1904. NICKEL STEEL.—A. de Dion and G. Bouton, Paris. The addition of from 0.5 to 2 % of silicon to nickel steel in order to increase its strength.

27,073 of 1904. ROASTING FURNACE ATTACHMENT.—U. Wedge, Ardmore, Pennsylvania. Improved method of cooling the stirring arms of roasting-furnaces.

Week Ending February 18, 1905.

6,293 of 1904. FEEDER FOR ROCK DRILLS.—E. Dickinson, Sheffield. In automatic feeds for rock-drilling machines, the provision of ball-bearings between the back end of the barrel and the socket which carries the clawfoot at its end.

Special Correspondence.

San Francisco. March 7.

At the time the California Miners' Association held its annual convention in this city, in December last, Prof. S. B. Christy, of the University of California, read a paper on the débris question in this State, and brought out certain new points, which resulted in a memorial being sent to the President of the United States, asking him to assist in the solution of the problem by instructing the Director of the United States Geological Survey to undertake a particular study of those portions of the Sacramento and San Joaquin valleys affected by the detritus from torrential streams. The connection of the mining débris question with that of river improvement was thus stated by Mr. Christy:

"The bay may be injured for purposes of deep-sea navigation long before it is filled up. Mare Island navy yard is of great importance to the government in time of war and peace. It must not be filled up by the scouring of the Sacramento river. Great stretches of bay are already useless. Our river problem differs from that of the Mississippi in several important points. Our rainfall is concentrated into a few short months. The flow varies from one to ten miles in the same year. The carrying of sediment varies from one to 1,000 times. Our rivers are fed directly by torrential streams. Unless natural and artificial sediment will simply convey this sediment through the rivers, whose beds will rise and will continue to rise, the levees must be constantly built higher, and the sediment will finally fill the bay of San Francisco.

"Restraining hydraulic miners from discharging boulders, gravel, sand detritus, clay or other material in suspension, if taken literally, would close down not only the business of every hydraulic miner, but every gold dredging, drift, quartz and other mine in the State; also every cattle, sheep and hog ranch and farm in California that discharges muddy water. The Anti-Débris Association has been interpreting the letter of the law. The human agencies that augment erosion and injure the navigable waters of the State include the cutting of roads and railways, cutting of timber, forest fires, cattle, sheep and hogs, plowing and tilling the soil, hydraulic and other kinds of mining where tailing are not restrained, building of levees and reclamation of tide and overflowed lands. Literally applied, Judge Sawyer's decision would stop farming as well as mining, and anti-farming associations could appeal to it to stop plowing and cattle raising; spies could show that clay or other substance was discharged by these operations into the navigable waters of the State."

The points asked for by the California Miners' Association in the memorial to the President:

First.—The most favorable sites for reservoirs of water, whereby destructive floods may be averted and the waters stored and utilized for the benefit of agriculture, mining and other industries.

Second.—The selection of suitable tracts of waste lands and of the most suitable means whereby detritus from torrential streams may be deposited on such waste lands, so as to reclaim them and convert them gradually into lands suitable for forestry and other agricultural purposes, and at the same time to remove from such streams their burden of detritus, so that it may cease to be a menace to the navigable waters of the State. The matter was acted upon favorably by the President, and the Secretary of the Interior has written to the president of the California Miners' Association to the effect that the department, through the Director of the Geological Survey and his assistants, will endeavor in all practical ways to assist the association, and will try to aid in bringing about, particularly through the reclamation service, the attainment of the desired end. J. B. Lippincott will probably have charge of the work.

A big placer mining proposition in the mining field east of Ramona, San Diego county, has received a quietus in the shape of a decision on water rights, after some $20,000 had been expended in preparation. E. R. Sanday, D. D. Bailey and others filed on a body of water on the San Pasqual river, and has been some time running a tunnel through a mountain, through which to divert the water and bring it on the placer ground. Ranchers along the river, who had been using the water for irrigation purposes for some years, brought suit to prevent the diversion of the water, and the judge has decided in their favor. The case involved priority of water rights, and the decision enjoins the miners from the use of the water on which they filed.

Denver. March 10.

The leasing of the properties of the Stratton estate, located on Bull hill, of which it owns about one-sixth of all the surface, will mean the employment of a large number of miners. This locality has for several years produced an enormous amount of high-grade ore. Within the next two weeks a large number of applications will be passed upon by the executors.

George M. Irwin, the referee, has denied the petition of the Eagle Sampling Co. for the return of the ore and bullion, which is part of the assets of the defunct General Metals Co., to the amount of over $50,000.

The telluride mill at Colorado City has been advertised for sale at public auction.

The third trial of the Doyle-Burns suit was commenced at Council Bluffs on March 8 before Judge Thornell. In the two former trials Doyle secured a large verdict.

The Mary McKinney Mining Co., against which a judgment of $164,407 was rendered a few days ago in favor of the Morning Glory Mining Co., made application for a new trial, which was promptly denied by Judge Hallett. Notice was then given of application for a writ of error so as to bring the case before the United States Circuit Court of Appeals.

After about five years of litigation in the state and federal courts, the United Gold Mines Co. and the Jerry Johnson Gold Mining Co. have adjusted their differences and consolidated their various interests. A. P. Mackay will be president of the new Jerry Johnson company and the United company will be prominently represented in the board of directors.

When the application of Denver creditors of the defunct Idaho Springs Reduction Co. was heard in the federal court, an important question was brought up and a point raised on which there does not seem to be an authoritative decision. This is whether a milling company can be considered a mining company within the terms of the bankruptcy laws. Judge Hallett took the matter under advisement and afterwards decided that a milling company cannot be considered a mining company in this case.

During the past week an important contract was made between President Parsons, of the Newhouse Tunnel Co., and a syndicate controlling certain properties in Gilpin county, to work the Twolon mines through the above tunnel. At the point where this tunnel cuts the Twolon vein the ore is of excellent quality. This will be the first Gilpin county mine worked through the great bore, the others being located in Clear Creek county.

Local parties in this city have bought the old Lobato land grant in northern New Mexico, consisting of about 156,000 acres of agricultural and mineral land.

During the last week of February there were shipped from the Black Hawk depot to the Denver and Golden smelters 1,800 tons of ore and concentrate, making a total of more than 6,000 tons for the month of February.

The so-called Page mill at Florence, which was erected some years ago by an English company, but never operated by them, was completely destroyed by fire a few days ago. It was owned by the Florence Milling & Leasing Company.

Scranton. March 15.

The Delaware, Lackawanna and Western Railroad Co. closed down its Cayuga colliery on March 8, and Storrs No. 1 on March 9. The former will be idle for about five or six weeks, while the latter will be idle for at least three, and perhaps four months. The company will concrete the shaft of the Cayuga. It has been decided, as fast as the wooden cribbing in the mine shaft shall wear out, instead of replacing them with wooden cribbing, to line the shaft with concrete. While the mine is closed the miners in the Cayuga will be placed in other mines in the North End section of this city until the work is done. The purpose of closing down the Storrs shaft is to sink the shaft down to the Chican vein. While this is being done the men who have been working in the mine will be transferred to Storrs No. 2 and 3. The Storrs No. 1 breaker, however, will not close down. On account of the increased output of the other mines, by reason of the increased force of men working in them, the coal will be shipped to this breaker in preparation for market. The output will be maintained, except the output of the Cayuga.

On March 9, through the breaking of a cable on a hoisting cage, seven miners were dropped 200 ft. to the bottom of the Clear Spring Coal Co.'s shaft, at West Pittston. The bodies of all the men were terribly mangled, many of them beyond recognition. From what can be learned at the mine, no blame can be attached to any of the employees for the disaster. Unfortunately, the superintendent and his deputy were away at the time. The men had finished their work for the day, and had boarded the mine carriage to return to the surface, and when about 200 ft. above the bottom of the shaft the cable gave way and they fell to the bottom. They were all Lithuanians except one, who was a German. Mine Inspector McDonald and other experts, who were not far off, hurried to the scene, and at the risk of their own lives entered the shaft and found the bodies within an hour. The experts who examined the rope said that they could find no flaw in it, according to the statement made by Manager Clark, of the colliery. A thorough investigation of the accident and what led to it is being held.

There was a reduction of almost 500,000 tons in the output of anthracite for the month of February, as compared to the corresponding month of last year, this

being due to the scarcity of cars and the severity of the weather.

There is also a shrinkage in the production for the year, as compared with the two months of 1904. The following shows the production of each company:

	February.		Year.	
	1905.	1904.	1905.	1904.
Reading.	767,070	872,938	1,638,366	1,752,765
L. V....	565,802	621,700	1,328,926	1,307,084
Jer. Cen..	567,349	597,901	1,127,239	1,109,340
Lacka...	739,717	773,130	1,405,879	1,451,843
D. & H..	362,416	457,839	807,208	892,073
Penna...	335,965	363,507	695,943	701,497
Erie	294,512	336,949	717,993	663,830
N.Y.O.W.	176,362	199,261	389,218	379,292
D. S. & S.	113,508	121,544	219,897	204,688
Totals.	3,922,601	4,326,269	8,331,179	8,460,544

The average number of tons of coal produced per loss of life throughout Luzerne county was 122,236 in 1904, compared with the loss of one life for each 141,901 tons for the preceding year. The number of persons employed per life lost inside was 245 in 1904, and a loss of life for each 232 persons in 1903. Some of the increase is due undoubtedly to the increase in the number of men employed in the mines, but the number of tons of coal mined considerably decreased in 1904. About 40% of the fatal accidents were caused by the fall of rock. This ratio of life lost for the output in tons and for the number of persons employed in the inside of the mines holds good for the entire anthracite region. The number of mine inspectors elected is quadruple those that were appointed by the State previous to the recent law, which makes the selection of mining inspectors dependent upon the ordinary electoral vote of the county.

Houghton. March 10.

Michigan mines produced 17,800,000 lb. of refined copper, which sold for $2,700,000, in February. Accidents, labor troubles and the short month contributed to bring the output below the normal, but conditions are favorable for a good increase in March, which may establish a new high record for the district.

Osceola Consolidated has fully recovered from the effects of the trammers' strike at the old Osceola and the dynamite explosion in the North Kearsarge and is again making full returns, although it dropped off 500,000 lb. in February. With its refined output of 20,472,429 lb. in 1904 it took second place among the individual producers of the district, and this year should turn out at least 23,000,000 lb. The increase is coming entirely from the North and South Kearsarge branches, where the reserves of stoping ground are large and are being increased each month.

The Baltic, controlled by the Copper Range Consolidated Co., was the only property to report a record-breaking output last month. Its output is normal now, and until the milling facilities have been enlarged it is not likely that any large gain will be made. No. 2 shaft, the most southerly opening, is opening excellent ground. The drifts running southward, toward the Trimountain, are all good or encouraging. The promising prospects in that direction make the large stretch of territory there inviting, and the permanent No. 1 shaft will be started in that section some time in the future. No. 2 shaft should have its permanent equipment completed by next August, when the output of the mine should reach 15,000,000 lb. per annum.

Adventure produced 111 tons of mineral in February. The Knowlton lode continues to yield a fair grade of stamp rock, especially to the eastward from No. 3 shaft. The drift east on the eighth level is in 650 ft. and penetrates good ground, which is also true of the drift on the ninth level. The Butler, while not yielding anywhere near so much stamp rock as the Knowlton, is an important source of production, furnishing three-quarters of all the mass and barrel copper taken out of the mine. Including this grade of copper, the Adventure's mill returns averaged 23 lb. of mineral per ton of rock stamped last year, not a bad record by any means.

Coincident with the declaration of its first quarterly dividend, this week at the directors' meeting, in Boston, the lake management of the Copper Range Consolidated Co. announced an increase of practically 5% in the wages of its employees, placing both shareholders and laboring men in a happy frame of mind. The Copper Range company owns the Baltic and Trimountain and one-half the Champion mines, and the raise in wages was entirely voluntary, no representations for it having been made by the men. Upwards of 3,500 employees are benefited by the company's action.

Duluth. March 11.

More large stripping contracts are being made on the Mesabi range. The latest is by the Mahoning mine, with Winston & Dear, who are to strip a 40-acre tract adjoining the present Mahoning open pit on its west side. This will take several years, and is one of the very largest jobs so far let in the Mesabi region. Winston & Dear have done all the Mahoning's contract work since the mine was first opened, and nearly every yard of dirt moved has been by them. For the past two years the firm has been engaged in stripping the Burt, two miles east of Mahoning, and work at the latter has been by the company itself. They still have considerable work to complete their Burt contract. The Mahoning now has about 60 acres of ore uncovered.

The Pillsbury mine, which has been idle for nearly two years, has been reopened and mining has begun there. This is one of the last of the idle mines to resume, and it is not probable that the number of old properties to become active this year will be much increased, though several new mines are planned for opening during the season.

At Iron Mountain, Menominee range, the Oliver Iron Mining Co. is working at the Chapin mine, and is hoisting at the rate of nearly 1,000,000 tons a year. It is getting well started at Aragon, and will push that to the limit. This mine has been thoroughly re-equipped during the past year, and is in the best possible condition for a very large output, economically secured. The machinery outfit, on surface and underground, has been replaced by new. At Iron River the company is pumping the Dober, and the work of unwatering the Mansfield will start at once. This mine lost its shaft last fall, and a second has been equipped and is ready for business.

The Wisconsin Central road is entirely rebuilding its great bridge at "Highbridge" over the White river, and has driven 1,500 piles, and is now commencing to haul the 400,000 cu. yd. of earth that are required to make the fill. The river will be spanned by a heavy concrete arch, and trains will no longer be obliged to creep over what has been the most dangerous bridge in the entire ore railway system of the Lake Superior region.

Salt Lake City. March 10.

The stockholders of the Bullion Beck & Champion Mining Co., of Tintic, have re-elected the old board of directors to serve for another year, which organized with P. T. Farnsworth, president; Joseph F. Smith, vice-president; M. C. Morris, secretary, who, with James A. Cunningham, A. E. Hyde, H. C. Lund and P. T. Farnsworth, Jr., constitute the board. All are residents of Salt Lake City.

The initial shipment of concentrate from the new Newhouse mill, in Beaver county, where the ores of the Cactus mine are being reduced, has reached the Salt Lake market. A. J. Bettles, chief metallurgist, under whose supervision the early tests were conducted, has made the statement that the results are much better than those obtained from the experimental mill. The new plant has been working with exceptional smoothness. All the adjustments have not been completed, but it is expected they will be by the end of another week, when the mill can be brought up to its capacity.

The annual report of the Horn Silver Mining Co. has been submitted to stockholders, and shows that on the first of the year the treasurer had a balance on hand of $51,890. The receipts during the past 12 months from all sources aggregated the sum of $212,387, and there were produced 15,912 tons of crude ore and concentrate. From this was obtained 7,432,855 lb. of lead, 110,541 oz. in silver, 593 oz. in gold, 1,588,287 lb. of copper, and 391,676 lb. of zinc. The dividends paid aggregated a total of $60,000, and the amount paid out for labor reached the sum of $63,601. The company has outstanding in call loans $15,000, and supplies on hand to the value of $3,835.

P. T. Farnsworth, the manager, in his report stated that the mine still contains some large bodies of mill ore on the 500 level, and that there has been developed what appears to be an important orebody on the north 800. The percentage of lead value in the latter is considerably below the general average, but the silver is correspondingly very much above. This is new ground. Next in importance is the south 500 level, where, the manager says, there are large bodies of ore; about 20 per cent mass carries high-grade values, running about 40% lead and 10 oz. in silver. Only trial shipments of zinc ore were made. The mill for the treatment of this class is now in operation, working at present on the old tailing dump below the concentrator.

The cost of each ton of crude ore during the past year averaged $5.066, while the cost of concentration at the mill was $1.592 per ton. The average value of the first-class ore was $12.02; first-class copper ore, $28.55; first-class lease ore, $20.24; zinc ore, $7.05, and concentrate, $13.21 per ton.

Spokane. March 8.

E. J. Roberts, general manager of the Federal Mining & Smelting Co., operating in the Cœur d'Alenes, has resigned to become chief executive officer of the Spokane & International Railway Co. The company will build a road from Spokane northeast into British Columbia, to connect with the Canadian Pacific. Mr. Roberts' resignation will be accepted at the meeting of the directors of the Federal company, in New York city, March 20, when he will be promoted to the vice-presidency. That will permit of his giving general oversight of Federal affairs, while relieving him of much office routine.

W. Clayton Miller, assistant general manager of Federal, with offices at Wallace, Ida., near the mines, will be promoted to the general management. He is slowly recovering from a recent illness, but it is expected that the change will be made April 1.

Ohio people who took control of the White Cross gold mine, near Moscow, Ida., and put a compressor there to help development, have been rewarded by striking ore in the crosscut tunnel sooner than was expected. The little mill will be started again under Samuel Tinkey, a mill man from Murray, Idaho.

Directors of the Panhandle Smelting Co. will meet in Minneapolis this week to let contracts for sampling and electric machinery, which will complete the equipment. D. W. Casseday, land and immigration commissioner of the Soo road, at Minneapolis, has resigned to give all his time to his duties as president of the Panhandle company, and will be here this month. Pending the arrival of machinery, no work is being done at the new lead smelter at Ponderay, near Sandpoint, Ida., but iron ore is being taken out from the company's Venezuela mine. The First Bank of Ponderay has been formed to do the financial business of the town. It is backed by John Ehlers, a banker of Harvey, N. D., who will move here.

The Concord Mining Co., operating the Mother Lode mine, in Buffalo Hump, Ida., has found ore on the 200-ft. level. Twenty feet runs $9.50, according to Superintendent Will Brown. Streaks give values of $200. Drifts are being run north and south. Twenty-two men are employed.

Chris Knutson, who is interested in the Silver Butte, or Last Chance mine, at Northport, Wash., has taken control of the Great Republic, a copper-gold prospect, near Northport.

Butte. March 8.

The output of ore in the Butte district during February aggregated about 360,000 tons, of which Amalgamated mined 280,000; W. A. Clark, 35,000; United Copper, 26,000; Speculator, 14,000, and smaller companies and individuals, 5,000. United Copper would have extracted more had it not been that one of its principal producers was out of commission during the entire month. The total is an average of about 12,800 tons per day. Little mines in the eastern part of the city added considerable to it. These mines are just commencing to show their real value as copper-silver ore producers, sufficient depth having been attained on some of them to carry the workings into the extensive mineral zone. The Cambers, owned by the Amalgamated, is the largest producer at present, its daily output being between 100 and 150 tons. United Copper has resumed operations on the Belmont, in the same district, with an increased force of men. The shaft on the property is 1,030 ft. deep. A cross-cut has been driven south and north from the bottom, each being between 250 and 300 ft., but a heavy flow of water in the south has prevented a continuance of work there. Drifting is in progress east and west on the north side. The vein there is from six inches to a foot in width. It is good ore, but there is not enough of it to satisfy the company. This mine lies a short distance south of the Cambers and Moonlight, and the object in doing the work in it is to catch the veins of these mines. The company believes it will have to add 200 ft. to the shaft to accomplish its purpose. The Dutton mine, east of the Cambers, is yielding a large quantity of good ore. It is owned by the Butte Copper Mining & Smelting Co., but is under lease. It is only a fractional claim. The Westlake, only a few yards south of the Dutton, is also yielding ore in paying quantities. An attempt to wreck it with dynamite was made on March 8, a box of the explosive being set off just below the collar of the shaft.

The Green-Campbell company, operating at Silver Star, Madison county, shipped ore during February that netted $9,000. It has a vein of gold-bearing ore 11 ft. wide, one foot of which averages $120 per ton, and another foot that runs $40. The remainder carries a value of only $8. Only the first-class ore was shipped. At a meeting of the directors a few days ago plans for the erection of a stamp mill were consummated. The work will be commenced as soon as possible.

Pay ore, gold and silver, has been struck in the Salvadore mine, in Butte, the controlling interest in which is held by Joseph Stettheimer, of Chicago. The vein is not wide, but the ore is rich, assaying between 100 and 150 oz. in silver and $15 in gold.

The Josephine group of copper-silver claims, east of the city, is under lease and bond to Sutton & Wall, who are extracting ore from the developed claim of the group. The property is owned by Henry McCloskey, an old-time miner and prospector of Butte.

The Mountain View, one of the heavy producers of the Boston & Montana, will not be yielding ore for a few days on account of the breaking of the driving-rod of the hoisting engine today. The other mines of the company will be able to supply the demand of the smelter until the damage is repaired.

Deadwood. March 11.

The annual meeting of the Hidden Fortune Gold Mining Co., which was held at Lead City on March 7 and 8, resulted in a harmonious selection of a good business board of directors and the laying of several plans which, if carried to a conclusion, will assure the ultimate success of the company. Directors elected were: John P. Allison, capitalist and president Dakota Mining Co.; Henry Frawley, attorney; T. J. Steele, capitalist and cattleman; N. E. Franklin, cashier American National Bank; Otto P. Th. Grantz, mine owner, all of Deadwood; E. W. Rice, president Merchants' National Bank, Sioux City, Ia.; John H. Morcom, president Colorado Iron Works; Herbert S. Shaw, broker, and A. M. Stevenson, ex-Senator, of Denver.

The financial statement showed the company to be in debt to the extent of nearly $200,000. The stockholders, by resolution, recommended to the directors that an assessment of three cents per share be levied against the outstanding stock, the proceeds to be used in liquidating the indebtedness, making improvements in the mill and fully developing the mine.

The Clover Leaf company has suspended operations in all departments except pumping and a small crew employed in constructing the bedrock dam and accompanying flume, which is destined to relieve the mine workings of a large amount of the troublesome surface water.

Workmen commenced March 6 setting up the machinery for a two-stamp Tremain mill at the Gertie tin mine, at Hill City. The management proposes to operate this experimental plant a portion of the coming summer, and endeavor to make a fair test of the values of the ores of the mine. It is claimed that a large body of good grade tin ore has been opened on the 500 level of the incline shaft on this property. The plant will be equipped with concentrators for saving the cassiterite and amalgamating plates for recovery of the free gold.

Last month's production of the Horseshoe company's mill was practically $40,000. The bars resulting from the last fortnight of the month weighed over 100 lb. and were valued at $22,000. A new shoot of ore has been broken into in the Hardscrabble, and though little is known of it yet, it is apparently of good proportions and assays $8 gold.

The Homestake Extension Co. has been making excellent progress in driving its tunnel. During the last seven days 49 ft. has been added to the length of the bore. Steam drills are being used at present, but are to be supplanted by air machines upon the arrival of a compressor and 80-horsepower boiler, which are now en route from the manufacturers.

The Homestake company has declared a double dividend of 50 cents a share, payable March 25.

Bisbee. March 9.

Members of the Chiriachua Development Co. and others have taken up about two and a half miles of land on the trend of the copper-bearing formation in those mountains, and have organized the Manhattan Development Co., with $200,000 capital, in 20,000 shares, and $1 per share has been called in, to be paid March 8. The directors of this company include Messrs. Kaufman, of Marquette; T. F. Cole, of Duluth; Messrs. Rice and A. W. Rees, of Houghton, and N. W. Haire, of Ironwood, Mich., and the management will be in the hands of J. H. Knowles, who is superintendent of the original Chiriachua company, at Paradise, Arizona. The company's lands cover a very large acreage, and the capital stock, when fully paid, will pay for these and carry on development work on a large scale. The original Chiriachua company is in copper, cutting ore that is assaying up to 40 per cent., and there is little question that the lands of the new company are similarly mineralized. Stock of the company has been allotted to shareholders, and was all taken up before the first information as to the organization of the flotation was out. Development work begins at once.

The Junction Development Co. has made a call of the final $4 due on its part-paid stock, to be paid April 15. This will bring in the sum of $140,000, and will be sufficient to carry on development and pay for the 3,000-gal. pumps just installed. It is probable that the company will be made a mining company very soon, in which case there will be an allotment of two and a half shares of new stock to every one of development, and a subscription, from stockholders, of two and a half at $10 per share. This would be preliminary to any combination of the five Calumet & Arizona companies.

Junction has begun sinking its shaft once more, and the pumping plant will be put into service as soon as water is reached. The water that stopped sinking some months ago has been drawn below the bottom of the shaft by the C. & P. pumps, 3,000 ft. away, and how far down they have taken it cannot be told. The action of these C. & P. pumps on the deep levels of the district is very surprising, and is exciting interest all over Arizona and the Southwest. Not only have they drained the Junction shaft, but those of the L. S. & P. and Lowell, each more than 3,000 ft. away, in different directions; but they have within a few days opened

a water channel as far as the Wolverine shaft, 5,000 ft. across the mountains, and the water level in that shaft dropped 70 ft. between two days. There is no explanation for this sudden drop other than the action of C. & P. pumps, suddenly opening a course through which this water could flow. It seems that for a mile in every direction from the C. & P. shaft the limestone is shattered and fractured sufficiently to permit the flow of water at great depths.

Dawson. Feb. 28.

About a quarter of a ton of copper ore has been brought in for test purposes from 175 miles up the White river from its mouth. Last summer Thos. Lloyd discovered a well-defined ledge in that locality, and has since prospected it. The value of the ore is being determined at the Dominion government assay office.

Quartz creek is reported to be unusually active this season, with more work in progress, and the dumps larger and more numerous than on any of the other creeks in the district. At no previous time in the history of this creek have so many men been at work on it, claims from 18 above Radford's discovery to 43 below being operated, with a larger quantity of gold being recovered than in any earlier season.

The *Yukon World* states that activity has increased to a marked extent since the weather has moderated, all operators making preparations for starting the season's work. Freighting has been heavier, the government roads being good, so that loads up to 5,000 lb. can be hauled over them.

Attorneys for the Canadian Bank of Commerce have issued a writ against Chute & Wills, Charles Carbonneau, and the Gold Run (Klondike) Mining Co., for the purpose of obtaining the foreclosure or sale of all the properties held by the defendants, in satisfaction of a mortgage held by the bank to secure the sum of $576,000 claimed by the plaintiff bank. The mortgage covers all the properties of the Gold Run Mining Co. Opposing factions holding interests in this company had recourse to litigation last year, and for a time work was suspended on it, until eventually Lieut. Wm. Bradley was agreed upon by the several parties concerned, as inspector having charge of the company's mining operations pending final judgment of the court as between the litigants. Now the mortgagees are endeavoring to obtain possession or sale of the property.

Announcement has been made of the intention to commence at once construction work on the road which the Klondike Mines Railway Co. plans to build between Dawson and mines in the district.

A stampede has taken place from Fairbanks to the scene of a reported discovery of gold-bearing quartz, stated to run from $00 to $600 per ton. All the country in the neighborhood of the find, which was made at a point distant about 25 miles from Fairbanks, has been staked, and development is proceeding. Men are taking the trail from Valdez to Fairbanks, and heavy travel is expected as soon as the Tanana and Yukon rivers shall again be navigable.

T. C. Powell, United States marshal, who left Seattle a fortnight ago, is expected to reach Nome, to which post he is a new appointee, about April 1, traveling by way of Valdez and Fairbanks. He is accompanied by J. C. Talman, deputy marshal.

Sudbury. March 8.

The first run at the Shakespeare gold mine near the village of Webbwood has produced three bricks representing about $3,000, and they are now on exhibition at the office of the Imperial bank, Sault Ste. Marie. This is the product of three weeks' run with a four-stamp mill. A few enterprising business men from Minnesota took up the development work of this mine nearly two years ago with this result. A yield of $23.50 to the ton is said to be the average run of the mine. A new five-stamp mill has been ordered and will be in operation about the middle of March.

A winding up order has been issued in the matter of the Rock Lake Mining Co., Ltd. S. T. Blackwood has been appointed liquidator. This copper mine and plant is about 12 miles from the Bruce mines, once the center of the copper industry in Canada. The Rock Lake mine was in active operation for two or three years, during which time a large amount of money was spent in development work and construction of plant, which includes a large concentrator on the shore of Rock lake, about one and a half miles from the mine.

The Williams mine, near Sault Ste. Marie, is shipping 35 tons of iron ore per day with a view of testing the properties of the ore and also to determine the quantities available. Should the prospect prove to be of commercial value a spur line will be built into the property from the Algoma Central railway next fall.

New electrical machinery is being installed at Sault Ste. Marie in the power plant of the Lake Superior Power Company.

It is reported that the Edison Sault Electric Co. will erect a large power plant on St. Mary's rapids near the locks on the Michigan side of the river, and that the sum of $120,000 will be expended during the coming summer. The first section is to have a capacity of nearly 3,000 horsepower.

A new clay mill has been established at Copper Cliff in the converter department of the smelter. The machinery was built and installed by the Allis-Chalmers Company.

Toronto. Mar. 10.

The Senate of the Dominion has appointed a special committee consisting of Messrs. De Boucherville, Sullivan, Edwards, Wilson and Domville to inquire into the production of alumina and aluminum in Canada. This action was taken in view of the expiration shortly of the American and British patents for the process by which aluminum is produced from clay by electricity. Senator Domville expressed the opinion that there was a great future for this industry in Canada.

The financial statement of the Province of Nova Scotia shows that the largest source of provincial revenue is now royalties from mines which, during the fiscal year ended Sept. 30, 1904, yielded $585,252—a decrease of $34,000 as compared with the previous year. This was owing to the fire at No. 1 Dominion coal mine and the steel works strike. Revenues from coal royalties have more than doubled since 1895, and the Premier predicts that the receipts for this year will be the largest in the history of the province. Mr. Tanner, leader of the Opposition, has urged the government to take energetic action to enable operators to place Nova Scotia coal on the Ontario market. They should remit the royalty of 10 cents per ton on coal going to Ontario for a term of five years and reduce it by half for a further period of five years. He also asked them to bring pressure to bear upon the Dominion government to make better transportation facilities for coal shipment and to increase the duty upon imported coal, urging that it was more important to cultivate interprovincial than foreign trade.

The Mikado gold mines, Lake of the Woods, are offered for sale by tender. The property comprises 300 acres, having three gold-bearing veins, the deepest workings being down 600 ft., with extensive plant. During five years of working about 48,000 tons of ore were treated, producing about $500,000 in gold, but the work was stopped for lack of capital. Tenders are received up to April 30.

The annual report of the Department of Crown Lands, Mines and Fisheries, of the Province of Quebec, was presented to the legislature of Quebec on March 3. It refers at length to the mineral deposits discovered in the northern portion of the province. Noting the development of iron, nickel, cobalt, silver and other mines in the portion of Ontario extending from Sault Ste. Marie to New Liskeard at the head of Lake Timiskaming, along the Canadian Pacific & Timiskaming and Northern Ontario railways, the report states that 395 miles of this rich mineral belt is in Quebec province. The width of this formation, which frequently appears on the surface in isolated zones, is very irregular and varies from 5 to 80 miles. These lands, with comparatively slight exception, are comprised in the new district of Abitibi, and the Grand Trunk Pacific railway will necessarily cross them at their greatest width, and by this means access will be afforded to the wealth they contain.

Victoria. March 7.

Cariboo.—The question of fixity of tenure for placer claims is again receiving attention, and those endeavoring to secure the crown-granting of placer claims are being opposed by others not in favor of placer claims being put on the same basis as mineral or lode claims in this respect. One supporter of crown-granting has pointed out in the press that among those working to this end are a number of the most prominent men in the district, either regularly engaged in mining their own properties or managing the properties of operating companies. It is contended that probably 85 per cent of the annual placer gold production of Cariboo is recovered by these men, who also employ about the same percentage of the white labor engaged in placer mining, whether hydraulic, drift or ordinary placering. The point is made clear that by far the largest part of the placer mining and development under way in the district is in the hands of men who want crown grants for placer claims.

East Kootenay.—At the North Star mine prospecting for new shoots of ore is reported to be resulting favorably, and ore of a grade suitable for shipment to the smelter is being taken out.

Some 35 men are now employed at the Sullivan Group Co.'s mine. The Riblet aerial tramway, 6,300 ft. long, connecting the mine with the railway, is running, and silver-lead ore is being sent down. The company's smelter, at Marysville, is about ready for operating, and the furnace may be blown in any day. A second 200-ton furnace is being erected, and a Haberlin converter, stated to be similar to one being tried experimentally by the American Smelting & Refining Co. at Pueblo, Colo-

rado, is in course of manufacture at Spokane, Washington.

An active season in placer mining is looked for in the district. Preparations for operations are being made on both Wild Horse and Perry creeks, also on Bull river, where a hydro-electric plant is to be installed.

Monterey. March 7.

The troubles between Oscar and Thomas Braniff and the United Mining & Development Co., over the Marconi-Doctor mines at Cadereyta, in the State of Queretaro, which were supposed to have been settled last September by the formation of the Braniff Mining & Smelting Co., are up again in the form of a suit for $600,000, Mexican, brought by E. G. Spilsbury, for the United Mining & Development Co., against the Braniff brothers, for breach of contract, and asking for $135,000, Mexican, given in part payment on properties, $118,000 gold for expenses incurred, and the remainder of the $600,000, Mexican, as damages. The Braniffs are said to look upon the suit as absurd, claiming that the actions of the Development company have not been fair at any time since negotiations were entered into, and that they themselves have advanced the money and the United Mining & Development Co. is the party liable for breach of contract.

In Oaxaca considerable interest has been aroused in the Taviche, Ejutla and Tlacolula districts as a result of the Ryder-Hamilton smelter proposition. C. P. Mena and A. L. Charlot are putting in a 25-ton Brian mill at Tlacolula to handle the ores of their Cosmopolita and Mariana mines, and to do custom work. N. H. Emmons and associates are endeavoring to take up the Guadalupe and San Tiburcio properties, including some 32 pertinencias, or 79 acres, a short distance to the southeast of Los Ocotes, in the Ejutla district, and traversed by some strong copper veins. Deals are said to be on for the Predilecta and the Tetrazini. Machinery for a 50-ton mill has been ordered by the Mexico Mining & Milling Co., of which Francis A. Wilson, of Washington, is president.

In the letter published on March 2 it was stated that the Peregrina mine in Guanajuato had been transferred to Messrs. McIlvey and Bryant for $480,000, Mexican. This is found to be erroneous. The mine was transferred to the Peregrina Mining & Milling Co., and the price was $482,000, gold.

London. March 4.

A legal action that has created great interest in mining circles has been decided this week. This was an action brought by Prince Chang against the Chinese Engineering & Mining Co., Ltd., and Messrs. Bewick, Moreing & Co., to obtain specific performance of the agreement under which coal mines in China were sold to the defendant limited company. The case was a long, tedious and intricate one, and almost all the leading lights of the legal profession were engaged in unravelling it. Devoid of its legal complications, however, the main points of the case are simple enough. For twenty years the coal mines at Kaiping, near Pechili, China, were worked by a native company, over which Chang was supreme. The operations were not carried on profitably, so five years or so ago the owners decided to ask European capitalists to come to their rescue, after having received many representations from local European residents to the effect that plenty of money could be raised in this way. The people ready to put up the money were a group of financiers in Belgium and Germany, who had many connections in England and in other parts of Europe. They commissioned Bewick, Moreing & Co. to go out to China, examine the properties and make a proposition. As is well known to most of your readers, H. C. Hoover went out for the firm and brought affairs to an apparently satisfactory conclusion in the year 1901. The Chinese are, of course, a haggling and procrastinating race, asking for far more than they ought to get. The terms of the agreement decided on were that Chang and the local people should still be paramount in the management, though the properties were to be handed over to an English company, to be called the Chinese Engineering & Mining Co., Ltd., for the sake of protecting the people who had put up the money. I do not think that anybody but the Chinese imagined for a moment that the control was to be anything but nominally in the hands of Chang. Anyhow, the point was risked, so as to put an end to otherwise interminable negotiations. Things went on all right for two or three years, during which time the properties were put into first-class shape and handsome profits made. Then the Chinese government awakened to the fact that the control of the collieries had virtually passed out of their hands, and Chang was notified that he had to get it back again. Hence his action in the English courts. After the whole case had been thoroughly threshed out, the judge came to the conclusion that the agreement giving Chang control was unassailable and had to be respected. The result is that the Chinamen are now going to run the show, instead of the directors of the English companies. I do not profess to understand the Chinese mind, so I cannot prophesy what they will do. It certainly seems a pity that the present administration and management should be interfered with, for they could hardly have beeen improved in any way.

Melbourne. Feb. 11.

Three of the Broken Hill mines, controlled in Victoria, are able to furnish news of an important nature. Of primary interest is that from the Junction North. This property has been shut down since lead last moved to below £11 because the ore opened up is so refractory that it can not be made to pay with the metal at that figure. The presence of rhodonite and garnet sandstone prevented a good recovery from the jigs and vanners, so the company got in touch with the Australian Metals Co., the holders of the local patent rights of the dry Wetherill magnetic separator. Experiments were conducted under the direction of Mr. Ullrich, who has achieved local distinction by the improved type of machine he has evolved for the treatment of Broken Hill ore. A splendid separation was achieved. The result is that the company has now installed eight magnetic separators of the Ullrich type. The average grade of the Junction North ore is 12% lead, 14 oz. silver and 7% zinc. The plant has just been started and it is too soon to say how costs will work out, or whether the recovery will approximate that secured under experimental conditions; but the fact that rhodonite and garnet sandstone are the bug-bears of local metallurgy invests the enterprise of the Junction North company with superlative interest. At Block 10, for instance, the rhodonite at the upper levels is causing great trouble, but if it could be eliminated before the ore went to the concentrator, or if the zinc could be taken out in the same operation, a great advance would be made in the treatment of Broken Hill ore. This is what the magnetic separator is expected to accomplish, and provided the dust nuisance does not lead to the intervention of the health authorities, it may not be long, if the Junction North plant is a success, before the magnetic separator is installed at other mines.

The South Broken Hill has smaller figures, but it is a mine that is going ahead by leaps and bounds. Its ore reserves alone are 1,300,000 tons and it is only mining down to 800 ft. Its profit for the half year was £51,000; and its surplus of liquid assets over liabilities amounted to £81,224. It raised, during the six months, 96,000 tons of ore of an average grade of 16.5% lead, 7.5 oz. silver and 14.1% zinc, and produced 17,024 tons of concentrate, containing 68.61% lead, 22.3 oz. silver and 7.66% zinc. The Proprietary does not disclose its costs or the grade of ore mined or the value of the concentrate won. But no such reserve exists on the part of the South. Its figures are probably a record for the field, and so I give them: Mining and filling, 9s. 4.6d.; development, 5.7d.; concentration, 3s. 8.6d., or a total of 13s. 6.9d. per ton. The dividend paid by the company during the half year was £20,000, and another dividend and bonus of a like amount is just to be distributed. The great feature of the mining at Broken Hill, apart from the splendid work done, is the honesty of the management. The stocks of the field, therefore, have a reputation which is not possessed to an equal extent by those of any other mining district in this vast Commonwealth.

Auckland. Feb. 15.

During 1904 New Zealand exported 519,720 crude oz. of gold, valued at £1,987,501, which is a falling off of 13,590 oz. in quantity and £50,330 in value, as compared with the figures for 1903. The actual production was probably a little greater than in 1903, the December export being very low, owing to more gold than usual being held by producers and gold buyers. This is proved by last month's export being much above the average, namely, 58,132 oz., valued at £234,812. The silver exported for the month amounted to 43,863 oz., valued at £4,427.

During 1904 the dredges in Otago, worked by public companies, produced 89,017 oz. of gold, valued at £344,275, which is an increase of 1,887 oz. over the previous year's yield. The west coast dredges, according to published returns, produced 26,827 oz., valued at about £100,000, a decrease of 3,792 oz. as compared with 1903. To these figures must be added an unknown amount obtained by privately owned dredges. During 1903 the number of these increased, both in Otago and on the west coast of the south island, and it is well known that the majority did exceedingly well. Hence the total amount of gold won by dredging in the south island during last year was probably over 130,000 oz., of a value of at least £500,000.

The returns that have come to hand since the last of December are above the average for this time of year, and indicate that the Molyneux river is comparatively low. Last winter's snow, except on the higher mountain peaks, is now nearly all melted, and should good weather continue, our dredges may be expected to show further improvement in their yields during the coming autumn.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. J. Parke Channing is in the South.

Mr. Hennen Jennings is on his way to El Oro, Mexico.

Mr. G. A. Packard, of Boston, was at Washington lately.

Mr. J. Power Hutchins is now at Zaragoza, in Colombia.

Mr. C. S. Herzig has returned to Melbourne from Mandalay.

Mr. W. P. Bonbright has returned to New York, from Colorado.

Mr. E. G. Spilsbury is returning to New York from California.

Mr. Chas. M. Rolker is on his way from London to Western Australia.

Mr. F. E. Johnesse is making examinations in Baker county, Oregon.

Mr. John Dewar, of Glasgow, arrived by the *Caronia* and is now in New York.

Mr. E. W. Sebben, of Denver, has been examining mines at Goldfield, Nevada.

Mr. W. S. Lecky arrived on the *Minnehaha* on his way from London to Montreal.

Mr. André P. Griffiths passed through New York on his way from London to Korea.

Mr. William M. Martin, of Carrizal Bajo, in Chile, is visiting the United States.

Mr. L. Hundeshagen, of Stuttgart, is visiting New York, on his return from Sumatra.

Mr. William J. Chalmers has resigned as vice-president of the Allis-Chalmers Company.

Mr. C. S. Siefert is in Mexico in the interest of La Harpe Smelting Co., of La Harpe, Kansas.

Mr. Edwin C. Holden, of New York, sailed by the *Valdivia* for Hayti, to be absent two months.

Mr. W. B. Milliken has been superintending ore tests at Denver. He is now at Goldfield, Nevada.

Mr. Robert C. Sticht has been elected president of the Australasian Institute of Mining Engineers.

Mr. John E. McAllister, smelter superintendent of the British Columbia Copper Co., is in New York.

Mr. Robert C. Kick is installing air-compressors at the Santa Rosa mine, at San Dianas, Durango, Mexico.

Mr. William F. French has accepted a position with the Continental Group Mining Co. at Vulcan, Colorado.

Mr. Frank Brown, manager of the Jumbo mine at Buffalo Hump, Idaho, has returned from a trip to the East.

Mr. A. H. Toll, superintendent for the Wallace Mining Co., of Pitkin, Colo., is visiting at Baldwinsville, New York.

Mr. Jno. M. Haley, formerly with the Federal Mining & Smelting Co., is now at Tonapah, Nevada, as consulting engineer.

Mr. Forbes Rickard has been appointed consulting engineer to the Jason Mining & Leasing Co., in Hinsdale county, Colorado.

M. Robellar, a French mining engineer, is at the Inguaran mines, in Michoacan, Mexico, in the interests of the Paris Rothschilds.

Mr. W. H. Whiteside has become vice-president of the Allis-Chalmers Co., to succeed Mr. William J. Chalmers, who has resigned.

Mr. A. B. Adams, president of the Guerrero Consolidated Mining Co., Mexico, is in Chicago to purchase machinery and supplies for the mines.

Mr. Charles Robler, formerly at the Brown Bear mine, Trinity county, Cal., is now in charge of the Draper mine, in Tuolumne county.

Mr. J. F. Kemp lectured on 'Contact Metamorphism and the Production of Ore Deposits' at the Massachusetts Institute of Technology on March 8.

Mr. J. E. Spurr lectured before the mining and metallurgical section of the Franklin Institute, at Philadelphia, on March 9. His subject was 'Tonopah.'

Mr. Henry M. Howe's 'Metallurgical Notes' have been reprinted in the *Revue Universelle,* under the title 'Notes pour un laboratoire de Metallurgie.'

Mr. J. W. Astley, superintendent of Le Roi mine at Rossland, B. C., is at Spokane recovering his health, which has been seriously impaired for some time.

Mr. J. A. Ede recently made a professional trip over the Waterloo coal-field, in Illinois, for the Symmes Valley Coal Co., of which he is consulting engineer.

Mr. B. F. Close, superintendent of the Helvetia mine, in Arizona, has been appointed consulting engineer to the Arizona Copper Commercial Co., at Globe, Arizona.

Mr. W. J. Craig has resigned as superintendent of the Yampa mine, at Bingham, Utah. He has held this position since the organization of the company now operating the property.

Mr. Grant B. Shipley has resigned as chief draughtsman for the mining department of the Union Iron Works, of San Francisco, to accept a position with the Allis-Chalmers Company.

Mr. E. J. Collins, formerly assistant mining engineer for the Calumet & Arizona Mining Co., at Bisbee, Ariz., is now superintendent for the Wolverine & Arizona Company, of the same place.

Mr. J. H. Ferguson, formerly general superintendent of mines at Battelle, Ala., has been appointed manager of the Lookout Mining Co.'s furnace at Battelle, to succeed Mr. John Dowling, who has retired.

Mr. F. H. Lerchen has became editor of the *Miner and Manufacturer,* of El Paso, Texas. Mr. Lerchen is a graduate of the Colorado School of Mines and he has been identified with the mining industry of the Southwest for several years.

Mr. C. B. Murray, for many years chief chemist of the Carnegie Steel Co., at its Edgar Thomson works, has associated himself with Mr. F. P. Maury, in the active management of the Metallurgical Laboratory, 611 Bailey-Farrell Building, Pittsburg, Pennsylvania.

Mr. H. Mortimer Lamb, formerly editor of the *British Columbia Mining Record,* and for several years the esteemed correspondent for this JOURNAL in British Columbia, has been chosen secretary of the Canadian Mining Institute. It is understood that Mr. Lamb will make his headquarters at Montreal.

Mr. W. S. Ayres, consulting mining and mechanical engineer to the Pacific Coal Co., will return East in the near future, having completed the plans and installation of a new anthracite coal mining plant at Bankhead, near Banff, Alberta, Canada. This plant has a capacity of 2,000 tons per day, and is equipped with the most improved appliances.

Obituary.

John Cavins, a pioneer of coal mining in Indiana, died at Indianapolis, March 9, aged 81 years.

Henry Norcross Munn, who for many years was associated with his father, Orson Desaix Munn, in the publication of the *Scientific American,* died on March 10, aged 54 years. As a young man he entered the offices of the *Scientific American,* assisting his father, until he was compelled to retire about 10 years ago by locomotor ataxia, which made him an invalid and finally caused his death.

Louis Philip Seeger, for many years a trusted employee of the American Metal Co. and the Metallgesellschaft of Frankfurt-on-Main, Germany, died March 12, aged 31 years. He had been ill for some time, and although there was hope of his recovery from a complication of diseases, a weak heart hastened his death. He was born and educated in Frankfurt-on-Main, and about 14 years ago came to America. During this period he acquired invaluable knowledge of the metal markets, and his kindly nature gained many friends and business associates, who deeply mourn his loss. He was a member of the American Institute of Mining Engineers and an ardent Free Mason, being the State secretary of the German lodges.

Societies and Technical Schools.

Engineers Club of St. Louis.—At the meeting of this club on March 15, Lionel R. Viterbo delivered a lecture on 'Fundamental Principles of Reinforced Concrete.'

Michigan College of Mines.—The second annual class-day exercises at this institution at Houghton, Mich., will be held at Houghton and Hancock on May 5. William G. Mather, president of the Cleveland-Cliffs Iron Co., will deliver the public address at Hancock, on May 5. The senior class has organized with Col. R. A. Linton as president, in order that it may more satisfactorily conduct the exercises of class-day. These exercises are held in May instead of at the midsummer graduation day on account of the impracticability of detaining the students at Houghton at that time. The students at this excellent institution number at present about 200. The instructors are men of especial ability in their respective departments. The board of control includes James McNaughton, William E. Parnall, William Kelly, M. M. Duncan, H. S. Goodell and J. M. Longyear.

Massachusetts Institute of Technology.—James Furman Kemp, head of the geological department at Columbia University, spoke before the Mining Society of this institution on March 8 on 'Contact Metamorphism and the Production of Ore Deposits.' In his lecture Mr. Kemp considered those contacts of limestone and eruptive rocks whereby large masses of garnets were formed. He showed that the impurities in the unaltered limestone were seldom present in sufficient amounts or in the right proportions to produce the large masses of garnets which occur as contact deposits, but that the formation of the garnets was aided by the addition of silica, etc., from the neighboring eruptive. He also showed that the minerals of orebodies occurring in the contact zone did not exist to any great extent in the unaltered limestones, but were thickly scattered throughout the eruptives.

Trade Catalogues.

Power core drill, class E No. 5, is described in a circular issued by its manufacturers, the Preslar-Crawley Manufacturing Co., of Cincinnati, Ohio.

Harron, Rickard & McCone, of San Francisco, Cal., are sending out the third edition of their catalogue No. 5, which illustrates and describes hydraulic mining machinery.

The Williams steam specialties for economizing steam made by the Williams Gauge Co., of Pittsburg, Pa., are illustrated and described in detail in a handsome catalogue issued by that company.

A high grade illustrated catalogue is sent out by the Bucyrus Co., of South Milwaukee, Wis. It contains excellent reproductions of photographs of this company's well-known placer dredge machinery.

A catalogue unusually attractive in design and execution is issued by the DeLaval Steam Turbine Co., of Trenton, N. J., and describes the DeLaval steam turbine and electro-motor centrifugal pumps made by that company.

Bulletin No. 118, of the Hyatt Roller Bearing Co., of Harrison, N. J., is a report made by Arthur L. Williston, of the Pratt Institute of Technology, covering comparative tests showing the friction of several types of bearings under various conditions.

The Ingersoll-Sergeant Drill Co. has issued the first of a series of bulletins, describing the labor-saving tools operated by compressed air. It describes the McDonald rivet forge. The series will be sent to any one who will send name and address to the company.

The Colorado Iron Works Co., of Denver, Colo., has prepared, in catalogue No. 10 A, descriptions of its ore-smelting equipments, ore-milling machinery and complete ore-reduction plants. The catalogue is carefully prepared, and is supplied with excellent illustrations.

Industrial.

The S. H. Supply Co., of Denver, is furnishing the necessary equipment to increase the capacity of the cyanide plant of the Black Range Mining Co., at Magdalena, N. M., from 50 to 150 tons daily capacity. The equipment consists of leaching and other tanks, cyanide equipment and supplies.

The Oliver Iron Manufacturing Co., of Duluth, has ordered from the Allis-Chalmers Co. four new engines for use in the Minnesota mines owned and operated by them. The engines are each of the Reynolds-Corliss cross-compound heavy duty type, with cylinders 18 by 34 in. in diameter and a 34-in. stroke. These constitute additions to the machinery which they now have in operation and are understood to be rendered necessary by an increase in production at the mines.

"Kearsarge" gasket tubing is a recent addition to the list of "Kearsarge" packings, manufactured by the H. W. Johns-Manville Co., of New York. Gasket tubing is especially desirable for certain conditions, is easy of application, efficient, and an article in which all engineers should be interested. The same company is also furnishing Kearsarge ring packing, a new form of their well-known coil packing. These rings can be furnished in any size and quantity, and the high standard of efficiency of their entire line of packings is maintained in this new product. Samples and printed matter may be obtained from the company's offices in New York, Milwaukee, Chicago, St. Louis, Boston, Philadelphia, Pittsburg, Cleveland and New Orleans.

At the annual meeting of the stockholders of the General Chemical Co., held on Feb. 16, the following directors were elected: J. Herbert Bagg, Everett B. Bragg, Henry W. Chappell, William M. Johnson, George W. Kenyon, James L. Morgan, William H. Nichols, Edward H. Rising, James Speyer, Sanford H. Steele, Chas. Robinson Smith, Clarence P. Tiers and Eugene Waugh. At a meeting of the directors, held last Thursday, the following officers were chosen: President, Wm. H. Nichols; vice-president, Sanford H. Steele; second vice-president, Chas. Robinson Smith; third vice-president, Everett B. Bragg; secretary, J. Herbert Bagg; assistant secretary, Thomas F. Burgess; treasurer, James L. Morgan; chairman executive committee, Edward H. Rising.

The Westinghouse Electric & Manufacturing Co. is building for the People's Power Co., of Moline, Ill., two engine type generators to be installed in its power station. The company is an old one in that section of the country, and has built up an extensive business in lighting and power work. The addition to their present equipment will be a 1,100-kw. two-phase alternator of the revolving field type, operating at 2,400 and 4,800 volts, and a 600-kw. 600-volt, direct-current machine. The alternating-current generator is a duplicate of a machine which the company put into service about a year ago. An order for three 300-kw. alternating-current generators has also been placed with the Westinghouse company by the Barber Lumber Co., of Boise, Ida. These machines will generate current at 440 volts, which will be transformed to 23,000 volts for transmission. The necessary transformers, switchboards and lightning arresters are included in the apparatus to be furnished.

The H. C. Frick Coke Co., an organization of the United States Steel Corporation, recently has placed contracts for electrical machinery for a central power plant, to be located at its new York Run coke works near Fairchance, Pa. This plant will at first supply only the York Run and Shoaf works, now building, but will ultimately also supply power to Kyle, an existing plant. The apparatus purchased includes three cross-compound Harrisburg engines of 750 h.p. each, three Bullock 400-kw. 2,300-volt generators, three 200-kw. 550-volt rotary converters, and complete switchboards. Pumps, carhauls, ventilating fans, etc., will be operated by 2,080-volt induction motors, ranging in size from 50 to 150 h.p., while smaller induction motors, in shops, etc., will be operated in connection with a 220-volt 3-wire lighting system. Rotary converters will supply current for nine locomotives and electric coke larries. The boilers will be supplied by waste heat from coke ovens, through fire-brick-lined conduits. One hundred ovens will be connected to supply the plant now building. With practically no fuel expense, low attendance and moderate maintenance, interest and depreciation costs, it is expected to attain exceptionally low cost per kw. hour for power used. The W. C. Wilkins Co., of Pittsburg, are engineers in charge of construction of the York Run and Shoaf works and power plant. Geo. R. Wood, of Pittsburg, is consulting electrical engineer, and the operating officials of the Frick Coke Co. are W. H. Clingerman, general superintendent; J. P. K. Miller, chief engineer, and G. E. Huttelmaier, mechanical engineer.

General Mining News.

Mineral Oil Exports.—In February the exports from the United States were 4,601,046 gal. crude oil, 3,521,754 gal. naphthas, 47,855,650 gal. illuminating, 7,640,028 gal. lubricating and paraffin, and 2,699,340 gal. residuum; total, 66,317,818 gal. For the two months this year the exports amounted to 147,501,540 gal., which compares with 141,220,582 gal. in the corresponding period last year.

ARIZONA.

COCHISE COUNTY.

Paradise.—At the Chiricahua Development Co.'s property developments and improvements continue to be made. The main shaft, called the Planet, has passed the 400-ft. mark in depth, and continues to go down. At the 400-ft. level a crosscut has been started and is now in a little over 30 ft. At the Mars shaft of this company work is progressing satisfactorily. This shaft was originally sunk, following the ore from the surface, and on an incline of about 45 degrees, and to a depth of 400 ft. After cutting about 70 ft. of ore and reaching the footwall of the vein, they came back to within about 75 ft. of the surface, where the shaft was pretty straight and nearly perpendicular, and followed this angle, and will continue to a depth of about 200 ft. from the surface, where they contemplate crosscutting, and will probably continue sinking also. The ore in this shaft is of a commercial value.

At the Cochise Consolidated Copper Co.'s property work continues satisfactorily and rapidly. Harry Alexander, the president, who has assumed charge of the work, is doing some efficient exploratory development, and the company will start improvements in the near future, including the erection of a concentrating plant. The main shaft is down 125 feet.

The Savage Gold & Copper Co. is pushing work rapidly from three points. On the western end of the company's property they are sinking a single compartment exploratory shaft 5 by 7 ft. in the clear and are in good ore; the size of the orebody has not been determined, as this shaft is only about 45 ft. deep. East of this shaft about 2,000 ft. they are sinking their main shaft with two shifts. They have attained a depth of about 100 ft., have about passed through the unaltered lime, and are coming into the altered lime. They do not expect to strike the ledge until they have sunk to a depth of about 400 ft., but striking the altered lime at a depth of 100 ft., they may be entering their mineral zone sooner than expected. This shaft is on the south side of the mountain, and the company intends crosscutting at about the 200-ft. level to connect with the adit it is driving into the north side of the mountain. This adit is now in about 100 ft. They will have about 500 ft. still to run before connecting with the shaft, and the adit will give a depth of about 300 ft. below the apex of the mountain. S. S. Badger has just completed laying out the smelter site for the company.

GILA COUNTY.

Old Dominion.—The smelter at this mine, at Globe, is temporarily shut, on account of a wash-out on the railroad, which caused a shortage of fuel. The estimated output for February was 900 tons, or 1,800,000 lb., which is at the same rate as January, considering the fact that Febru-

ary contained three days less than January. The company is now prepared to run three furnaces, and as soon as railroad conditions will permit of the securing of adequate fuel supplies, three furnaces will be kept in constant operation.

GRAHAM COUNTY.

Arizona Copper Co., Ltd.—The production for the month of February was equivalent to 1,035 tons of copper.

CALIFORNIA.

AMADOR COUNTY.

Kennedy Mill & Mining Co.—The large mill having been all completed and set running, the era of dividends has again come to this property at Jackson; Webb Smith, superintendent.

José Gulch.—The title to this property having now been settled, the mine and mill will shortly resume operations.

CALAVERAS COUNTY.

California Placer.—The extensive improvements at this mine have been completed, and the work of taking out gravel has been resumed. The mill has been moved to the new shaft, and will now be run by electricity.

Elliott.—From this mine at Oleta (S. K. Thornton, superintendent) a number of tons of good ore are being crushed at the Cooper mine.

EL DORADO COUNTY.

Vandalia.—It is reported that this mine, Big Cañon, will again be started up.

Church.—Hill Bros. have disposed of their bond on this mine at El Dorado to San Francisco men, who will reopen the mine. The shaft is being unwatered, and deeper explorations will now be made.

Oliver.—This quartz mine at Greenwood (H. E. Leaderich, superintendent) has a double compartment shaft down 200 ft., and drifting is being prosecuted at that depth.

Larkin.—On this placer south of Placerville is a deposit of pyrites, and F. H. Harvey and W. Baker have bonded the property. There is a shaft down to water level, and there is a hoist on the ground. The lessees will continue the shaft deeper and open the deposit more extensively.

INYO COUNTY.

Beveridge.—A great deal of development work is projected in this district the coming summer. The old Keynot mine, at Lone Pine, at one time a great gold producer, is to be reopened. The Edwards mine is also to be developed.

Reward.—It is reported that this mine at Reward will soon be started up and its mill run to full capacity.

MONO COUNTY.

Chicago.—This old district, southeast of Benton and a few miles from the Sherwin mines, is again attracting attention, and many relocations have been made there within the past few weeks.

NEVADA COUNTY.

Empire.—Finlayson & Jackson are putting up a cyanide plant below this mine, Grass Valley, to work the tailing which leaves the Empire sand plant.

Norambagua.—This old property near Grass Valley, including the Norambagua, Bourbon and Champion claims, has been sold to Eastern men for about $50,000. Albert Maltman, of Nevada City, will be the superintendent. There is a shaft 560 ft. deep, and over $1,000,000 has been extracted above that level. The mine has been idle many years, but will now be vigorously worked.

Conlin.—This mine at Grass Valley, which has been idle several months, will now be started up under superintendence of H. G. Brunnier. The shaft on the mine is 700 ft. deep.

SACRAMENTO COUNTY.

El Dorado Dredging Co.—The hull of the dredge of this company at Fair Oaks has been floated in the pit prepared for it, and the machinery will now be installed. Edward H. Benjamin is manager of the company, and H. E. Pickett superintendent.

SHASTA COUNTY.

Mammoth.—At this mine, Kennett, the compressors are in place and the machine drills have been started up. About 200 tons of ore are taken out daily.

Great Western Gold Co.—This company, which owns the Afterthought mine, has purchased from Red Bluff men the Donkey mine in the same district.

SIERRA COUNTY.

Empire.—At this mine in Gold Valley, 14 miles north of Sierra City, A. N. Butts, superintendent, a fine chimney of ore has been opened, and a 20-day mill run produced $8,000. This was for a long time closed down until Mr. Butts, of Colorado, reopened it.

SISKIYOU COUNTY.

Derry.—This group of mines near Hornbrook, about a mile from the Jilson mine, has been bought by San Francisco for about $25,000. There are several claims in the group.

TUOLUMNE COUNTY.

Prudhomme.—Albert Bryant, superintendent of this mine, is about to cyanide several thousand tons of tailing.

Hard Times.—The machinery has been hauled in, and building of the hoist will proceed at once.

Bell.—The shaft of this mine has been unwatered to the 500-ft. level.

Mountain Lily.—At this mine, Columbia, operated by Heath & Grim, the mill has been overhauled and a large quantity of good ore is in sight.

Los Angeles.—At this property, near Ward's Ferry, Superintendent Kuhns will add five stamps to the mill, making 15 in all.

Draper.—Superintendent Herthel has 40 men at work on this mine, at Soulsbyville, and the mill is running steadily on good ore. Six Damas & Francis drills are now in use. The new 8-machine compressor is run by water power. A new and larger hoist is to be installed. Charles Dobler, formerly of the Brown Bear mine, of Trinity county, is about to be placed in charge of the property.

YUBA COUNTY.

Dannebroge.—The Hibbert & Burns quartz mill has been purchased and moved down to the old dump of this mine, where several thousand tons of ore will be worked. The mill is to be run by water power.

COLORADO.

CLEAR CREEK COUNTY.

February Ore Shipments.—The shipments from the Idaho Springs depot to the valley smelters were 214 carloads, or 5,350 tons, being in excess of 95 per cent. over the shipments for the corresponding month of the former year.

Alpha.—This property, in Gilson gulch, has been started up by the Black Mining Co., in which eastern parties are interested, with W. P. Black, Idaho Springs, as manager. The main shaft is down 260 ft., and active developments will be carried on as the lower levels show some ore.

Consolidated Gem Mines Co.—This company, in order to meeet increased demand for power, lights and heating, has placed an order for a 400-h.p. Filer-Stowell heavy duty Corliss engine, and also a 300-kw. General Electric generator, to be run in connection. W. E. Renshaw, Idaho Springs, is manager, and Eastern and Colorado parties are interested.

Burleigh Tunnel.—The Babcock & Wilcox water tube boiler of 250-h.p. was received and is being installed, and with its installation a number of machine drills can be put to work for developments on an increased scale at this property, in the Silver Plume section.

Western Star Mining & Milling Co.—Colorado and Nebraska parties are interested, and they have made arrangements for a resumption of operations on their Josephine property, on Chicago creek, with A. H. Colburn, Idaho Springs, in charge of operations. They have decided, after numerous tests, that their ores can best be treated by amalgamation, and will soon be shipping.

Wheatland.—New York parties are interested in this property, on Trail creek, and they are preparing for carrying on extensive developments, and may decide to install machinery at an early date. Charles Peer, Idaho Springs, is in charge of the operations.

Grouse.—This group of seven claims, at the head of Hoosaic gulch, has been leased and bonded to New York and Buffalo (N. Y.) parties, with Joseph W. Boyd, Idaho Springs, as manager, and operations are to be carried on through tunnel. The surface ores on this property were of unusually high grade.

Wide West.—A strike by Georgetown lessees during the past week on this property, on Leavenworth mountain, shows assay values of 1,400 oz. silver per ton, and the smelting streak is reported to be solid for its width of two feet. Henry Seifred, of Georgetown, is the owner.

Jo Reynolds Mining Co.—The Capital mill, recently purchased by this company, has been thoroughly remodeled and will be in operation in a few days, as the property is in good shape for keeping up a steady production. Manager R. B. Morton is having a sampler constructed, where the higher grade ores will all be tested before shipping to smelter.

Park.—Butler & Co., of Georgetown, have opened a smelting streak which carries values of $125 per ton, and they are preparing to install an electric hoist for operations.

Germania Gold Mining Co.—Articles of incorporation have been filed with the State Secretary, the incorporators being T. R. Keith and H. J. Benchoff, of Breckenridge, and W. O. Pratt, of New York. The office is to be at Breckenridge, Colo., but the company is preparing to operate in the Georgetown district.

Fort Dodge.—Eastern capitalists are negotiating for the transfer of this property, on Leavenworth mountain, owned by Lyman & Co. Some very good grade silver leads have been opened up on the group, and indications point to the transaction being closed at an early date. The property is located in the Georgetown section of the county.

GILPIN COUNTY.

Reward Gold Mining & Reduction Co.—The sixth consecutive monthly dividend has been paid by this company, in which

western Pennsylvania and New York people are interested, operating a group of mines in Enterprise district which produce silver-lead ores of a fair grade. The company is figuring on the erection of its own milling plant during the coming summer. B. L. Campbell, Central City, Colo., is superintendent.

East Whiting.—Eastern parties have become interested in this property, on Gunnell hill, and they are preparing for developments along liberal lines, under the direction of Dan McMasters, Central City. The main shaft is down 400 ft., and is to be sunk several hundred feet deeper.

Black Mining Co.—This company has taken the Iroquois mine, in lower Russell district, and has erected shaft buildings and installed machinery and is carrying on developments and opening up a copper-iron and lead product carrying favorable values. Henry Rohrer, Central City, is manager, and the product is smelting and concentrating. Denver parties are interested.

Empress Mining Co.—Eastern parties are interested in the Empress property, near Lake gulch, and after an idleness of over 20 years the property is to be restarted. A shaft building 25 by 54 ft. is being erected, a 35-h.p. hoist and 80-h.p. boiler are being installed, and the work of retimbering the 400-ft. shaft is well under way. After a thorough examination plans of development will be carried out. C. H. Karns, Central City, is manager.

Waucaweka Mining Co.—Eastern parties are interested and they have taken a lease and bond on the Independence mine, in Hughesville district, north of Black Hawk, with Henry Little as superintendent. A small plant of machinery was delivered to the mine this week.

Hampton Consolidated Mining Co.—Denver and eastern parties are interested, and they are keeping up developments on the Hampton, in Russell gulch, and are extracting enargite ores carrying values of from $40 to $60 per ton. It is reported that the company will install machinery at an early date. N. I. Hughes, Central City, Colo., is manager.

Chase.—This property, operated by local lessees, is turning out some of the best ores in the county, the product being entirely of the smelting kind, and shipments from the 250 and 300-ft. levels this week brought returns of 6½ and 9 oz. gold per ton, respectively. St. Louis (Mo.) parties are owners, and C. O. Richards, Central City, is superintendent.

California.—It is reported that the English owners of this property, in the Nevadaville district, are sending out a representative to start up the property. The California has the deepest gold shaft in the State, it being down over 2,200 ft., and it has been credited with a production of about $3,000,000. Water troubles have been the cause of its shut-down during recent years, but with the extension of the Newhouse tunnel to Quartz that problem would be remedied.

HINSDALE COUNTY.

Jason Mining & Leasing Co.—This company, operating the Golden Fleece mine, has let a contract for the extension of the seventh level westward to the fault plane or contact which bounds the bonanza ore-shoot of the upper workings of this mine, and preparations are being made for a more active exploitation of the mine generally. This property has produced over $1,500,000 in telluride ores, which yielded as high as $4,500 per ton.

LAKE COUNTY—LEADVILLE.

Coronado.—In addition to the 1,700 gal. of water that this property was raising per minute, the burden was increased during the week 600 gal., on account of an extra flow being struck in one of the drifts. For a day the lower workings were flooded, but when extra pumps were lowered and got to working, the water was beaten back and is now under control. At the Penrose shaft the water is being lowered at the rate of 10 ft. per day, and by the end of the week the bottom of the shaft will be reached, and the balance, 15 ft., of the shaft sunk. When this is done a large pump station will be cut at the 950-ft. level, and pumps installed with a capacity of 3,500 gal. per minute. When connections are made with the Coronado and the Penrose, the latter will be made the pumping shaft for the properties, and all of the water diverted in that direction from the Coronado, Midas and Sixth Street shafts.

Yak Tunnel.—The success attending the electric power installed in this property last December has induced the management to put in electric drills to drive the different drifts. The new work mapped out by the company consists of 5,000 ft. of drifting, and it was decided that this could be done cheaper with electric drills than by compressed air. The new work will be carried on in Iron, Breece and Jonny hills. The Belgian people have taken advantage of the tunnel and are now driving a crosscut from the big bore to their shaft, a distance of 1,500 ft. The Belgian is located on Iron hill, and it is more than likely that, while the crosscut is being driven, that it will open other oreshoots.

Murphy.—This shaft, on Rock hill, and above the Reindeer, has started to ship ore. The bottom of the ore has not been reached in the shaft as yet, and until this is done drifting, to ascertain the extent of the oreshoot, will not be started. The whole of the bottom of the shaft is in ore, and the values will reach close to $20 per ton. The present depth of the shaft is 380 feet.

Rock Hill.—This continues to be the center of attraction for mining men, and the different shafts that are going down all over it are being watched with a great deal of interest. At the Moffat shaft, of the Nil Desperandum group, water was struck at 720 ft., and work was temporarily stopped to permit of placing heavier pumps and an extra boiler. Only 15 ft. remain to be sunk, and work will be resumed this week. When the shaft reaches the proper depth drifting to the southward will be started to catch the Reindeer shoot. Work of sinking has been resumed on the Ben Burb shaft, northwest of the Reindeer. At the Mike shaft, being put down by the United Mine & Development Company, water was encountered at 150 ft., between the wash and the lake bedding. Two No. 7 Cameron pumps have been put in place, and sinking has been resumed. The English syndicate will start work on the Parsons claim by the middle of the month; the contract to sink the shaft 1,000 ft. has been let, and the machinery has been ordered and should be on the ground by next week.

Black Cat.—This mine, at the head of East Fifth street, will shortly start to enlarge the shaft to permit of the handling of a large tonnage. The shaft is 90 ft. deep, and the orebody encountered is large enough to permit of shipping 100 tons per day. The enlarging of the shaft and the opening of drifts will take about a month, and when this work is accomplished shipments will become regular. The character of the ore is lead and iron, carrying good values in silver.

Sunday.—When the owners took over this property, Dec. 1, they decided to go to the third level and continue the old drift to the oreshoot; the drift reached a distance of 450 ft., when the ore was encountered. A winze has been sunk in the ore for 25 ft., and the width of the vein is eight feet, carrying ore that averages $40 per ton; the character of the ore is lead silicious, running in gold, the lead averages 50%. The property is situated on Ball mountain, at the head of California gulch, and the claim is above timberline.

Flagstaff.—This mine, in Adelaide Park, has opened up a good body of copper sulphide at the bottom of the shaft. The shaft was sunk to a depth of 510 ft. when the ore was struck, and also water; it went down 10 ft. further, when work had to be stopped on account of the heavy flow of water. Pumps have been installed and extra boilers put in, and the shaft is again being sunk. The average value of the ore is very good, but the extent of the oreshoot is not known yet.

TELLER COUNTY—CRIPPLE CREEK.

Jerry Johnson.—A compromise has been made in the suit between this company and the Damon Gold Mining Co., which has resulted in consolidation of the two properties. A portion of these properties has been tied up for some time, pending the settlement of the litigation. This compromise, however, settles all trouble. The details of the consolidation are not yet completed. The properties are on Ironclad hill, adjoining the famous W. P. H. mine. A large amount of ore has been taken from these properties in the past.

Burns-Doyle.—The suit between James Doyle, formerly interested in the Portland, and J. F. Burns, who is at present one of the largest stockholders of the Portland Gold Mining Co., is being tried this week in Council Bluffs, Iowa. Quite a large amount of Portland stock is being sued for by the plaintiff, and also the dividends on this stock for a number of years past. Considerable litigation has already been had in this matter.

Triumph Gold Mining Co.—The new lessees, Osborn and Bernard, have commenced operations on this property. Considerable ore is already opened up in the mine, which has been idle for some time on account of litigation. The terms of the lease granted to Bernard & Osborne require a considerable amount of work to be done. The property is situated on Battle mountain, adjoining the Ajax mine.

Forest Queen.—Considerable ore is being shipped from the Walsh lease on this property, and from appearances it seems as though the property would become one of the large mines of the district in the near future. It is situated on Ironclad hill, just north of the W. P. H.

Stratton Estate.—A lease has been granted J. H. Hobbs and associates on the Orpha May and Orpha May No. 2 claims of the Bull Hill property of this estate, and work will be commenced on a large scale. The ground embraced in this lease is thought to be some of the best property belonging to the estate. Considerable ore has been shipped from it in the past, and developments are being watched with interest.

Page Mill.—This mill, situated in Florence, was totally destroyed by fire during the past week. The mill has been treat-

ing considerable low-grade oxydized ore from this district, cyanide being the process used. It is understood that the loss is partially covered by insurance, and that the mill will not be rebuilt, at least at present.

INDIANA.

The miners in the block coal field held a delegate convention in Brazil, March 8. The sessions were closed to the public, but enough leaked out to indicate that the delegates acknowledged the wisdom of John Mitchell when he urged them a year ago in the national convention to sign a scale for two years instead of one, even though they did so at a slight reduction. Conditions are such that if a scale were to be signed this spring, there would be a decided reduction insisted upon.

The legislature has revised the coal mining laws so as to prohibit the location of any boiler-house, inflammable structure or explosives near an escape way of a mine. The penalty of a fine not exceeding $500, or imprisonment for not more than six months, or both, are directed against violators of any section of the act that do not carry specific penalties.

State Geologist Blatchley's report on the clays and clay industries of Indiana will deal in detail with all the clays of the State, including the surface clays, carboniferous and knobstone shales, the under clays of the coals, silty and marly clays, alluvial clays, and the kaolin of Lawrence county. Clay mining and clay product manufacturing has assumed wonderful development in Indiana.

The Francisco Co-operative Coal Mining Co., of Francisco, Ind., has incorporated, with a capital stock of $25,000. The company will develop coal lands in Southern Indiana. Directors, John Arbuthnot, Adam Krausgril, Wm. Ireland, Charles Dill, P. C. Johnson and Landis Blackburn.

State Geologist Blatchley has reappointed James Epperson, of Linton, as State mine inspector for Indiana.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Atlantic.—There has been a slight falling off in the production of this mine during the last few months, owing to certain changes which are being made in the system of mining operations. Until these are completed there will be no change in the output, but as soon as they shall be finished, its production will be larger than before they were started.

Calumet & Hecla.—Drifts from some of the lower workings are being extended to the workings of the Tamarack Junior branch of the Osceola Consolidated mine, to drain the abandoned shafts and remove the danger caused by the big head of water accumulating above.

Centennial.—While production has suffered because of the decrease in rock shipments, which average only 275 tons daily now, the copper average has been improved by closer selection. Sinking in No. 1 shaft has been resumed below the 28th level, where it was bottomed for 14 months. All energy will be concentrated on development work during the next few months, 25 drills being engaged. Until such time as the openings are satisfactorily extensive no increase in output need be expected.

Franklin.—As soon as the ground is in good condition Supt. R. M. Edwards will start a diamond drill working to explore for the Kearsarge amygdaloid. A mass of copper weighing four tons was hoisted a few days ago from the old Franklin workings.

Mayflower.—Work is confined to crosscutting westward from the shaft on the 580-ft. level. Numerous lodes, some giving promise, have been cut, but wherever further work was undertaken the formations proved barren. Quite a portion of the tract remains to be explored.

Old Colony.—Operations are confined to a crosscut which is being driven east from No. 1 shaft to intercept some of the lodes which were located by a diamond drill; 30 ft. from the shaft a lode paralleling the one the formation in which the shaft is sunk was cut. Drifting failed to reveal sufficient copper to warrant further work.

KEWEENAW COUNTY—COPPER.

Ahmeek.—This mine produced 54 tons of refined copper in February. Rock shipments average 175 tons daily, secured from the extensions of 10 drift stopes and sinking. Both No. 1 and No. 2 shafts are below the fourth level.

Mohawk.—Rock shipments now average 1,800 tons daily. Sinking in No. 5 shaft reveals rich ground. The permanent Nordberg hoisting engine at No. 2 shaft has gone into commission.

Phœnix Consolidated.—The February output was 75 tons fine copper.

UTAH.

JUAB COUNTY.

Primrose.—This property continues to show improvement under development. A shipment of ore made this week netted $13 to the ton.

Uncle Sam Consolidated.—Everything indicates that this property has a very bright future. Late developments in the portion of the property near the May Day property are decidedly gratifying. In the drift run from the winze sunk from the 300-ft. level the whole face has been in ore for over 50 ft., a good portion of which is high grade, the values running up to 60% lead, in addition to the gold and silver contents. The directors have decided to sink the winze to the 500-ft. point, at which level the orebody will be tapped.

Yankee Consolidated.—This company is still sinking its main working shaft deeper, and at the same time shipping ore to considerably more than pay operating expenses. The treasury of the company contains about $80,000.

SALT LAKE COUNTY.

Columbus Consolidated Mill.—This plant, at Alta, is being operated with two shifts, and is turning out about 20 tons of concentrate daily. The third shift will be put on shortly. The product will net from $20 to $25 to the ton.

Alta-Quincy.—This property, at Alta, is developing very satisfactorily. It is reported that the company is sacking some good ore for shipment to the Salt Lake smelters.

Central Bingham.—This is a new company, organized to operate at Bingham. As a basis the promoters some time ago secured on an option what is commonly known as the Davis & Gebhardt group, which is in Carr Fork cañon, and near the properties of the Utah-Apex, Boston Consolidated, Utah Copper and Yampa companies. Samuel Newhouse is president; D. C. Jackling is vice-president; William M. Bradley, secretary; Charles W. Whitley, treasurer, who, with E. B. Critchlow, constitute the board of directors. In addition to the foregoing mentioned property, the company has acquired the Elephant lode mining claim. The property is to be equipped and opened on an extensive scale.

SUMMIT COUNTY.

Park City Shipments.—Ore was forwarded to the smelters last week to the amount of 4,760,640 lb., of which the Daly-West contributed 1,250,000 lb.; the Silver King, 2,766,640 lb.; Ontario, 170,000 lb.; Ontario (lease), 163,000 lb.; Kearns-Keith, 275,000 pounds.

New York Bonanza.—The management reports satisfactory developments at this mine. It is the intention to sink the shaft deeper. Shipments of ore made recently brought the company about $80 to the ton.

WASHINGTON.

FERRY COUNTY.

Morning Glory.—Under a two years' lease work was resumed on this property two months ago. Since then a small shipment of ore was sent to the Granby smelter from the east-west vein, and about four tons of $20 ore were taken from a vein which runs northeasterly from the station. Since then a rich pay streak has been found in the roof at the junction of the north-south vein, and an upraise of eight feet shows it 15 inches wide, feathering at the east end and apparently widening above and westward. The last assay from this streak ran $176 gold and 4 oz. silver per ton.

Ben Hur.—The installation of the hoisting machinery is nearly completed, and work in the mine will be resumed in a few days.

OKANOGAN COUNTY.

Copper World Gold Mining Co.—This company's claim is situated on the apex of Palmer mountain between the Leadville and Copper World extension groups of claims, 4.5 miles northeast of the town of Loomis. The orebody has a width of about 100 ft., and is easily traceable for a long distance. The ore is a copper pyrite overlaid upon the surface by a fine grained iron pyrite, that in turn being covered with a capping of soft oxidized material. The ore lies in diorite, which close to the orebody is shaly. From numerous assays an average value of from $10 to $15 is shown; the values consist of copper, gold and silver. Several shafts have been sunk on the ore, but the later developments are being made by running a tunnel to crosscut the orebody from the foot wall. The Palmer Mountain Tunnel Co., by a continuation of its tunnel, will tap the orebody of the Copper World Co. at a depth of 4,000 feet.

Buckeye Gold Mining Co.—This company has purchased the four claims located and owned by Harry Lilley, three miles east of Molsen. It is organized with a capital stock of 1,500,000 shares of $1 par value each, and commenced operations by buying the 20-stamp mill of the Spokane Mining Co., and removing it from Golden to its property. A large amount of free-milling ore is in sight on the property and in a short time the company will be ready to commence work on a large scale.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending March 4 were as follows, in tons: Granby, 10,890; Mother Lode, 2,624; Brooklyn, 1,894; Rawhide, 1,670; Mountain Rose, 150; Emma, 215; Senator, 30; Elkhorn, 20; total for week, 17,361 tons; total for the year to date, 136,401 tons.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort assto ize	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd	lb.	.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Craigmont, Ont.	"	.05½@.06½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb	.01½@.02
Italian, powdered	"	.01½@.01¾
Lump, per quality	"	.04
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10
Powdered	"	.10½
Carbonic, liquid gas	"	.12½
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
ALCOHOL—Grain	gal.	2.38
Refined wood, 95@97%	"	.70@.75
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
ALUMINUM—Sulphate, com'l.	"	.75@1.25
AMMONIUM—		
Bromide	lb	.20@.40
Carbonate	"	.08
Muriate grain	"	.05¾@.05¾
Lump	"	.09½
ARSENIC—White	"	2.75@3.125
Red	"	.06½@.06¾
ASPHALTUM—		
Barbadoes	lb.	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah ordinary	"	.03@.03½
Trinidad	"	35.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01½@.02
Chloride, com'l	100 lb.	1.25
Chem. pure cryst	lb.	.05
Nitrite, powdered	"	.05
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude No. 1	sh. ton	9.75
Crude No. 2	"	8.00
Crude No. 3	"	7.00
Floated	"	16.75@18.00
Foreign floated	"	18.75@20.50
Snow-white	"	17.25@18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton.	5.25@5.50
Second grade	"	4.50@4.75
Bleaching Powder	100 lb.	1.20@1.25
BONE ASH	"	.02½@.02½
BORAX	"	.07½@.07½
CADMIUM—Metallic	"	1.40
CALCIUM—Acetate, gray	"	2.30
Acetate, brown	"	1.55
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Chloride, f.o.b. wks	"	9.00@10.00
CEMENT—		
Portland, Am., 400 lb	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb	"	.80
Slag cement	"	.75@1.25
CHLORINE—Liquid		.30
Water		.10
CHROME ORE—		
(50%) ex-ship N. Y.	lg. ton.	19.00@19.50
Bricks, f.o.b. Pittsburg. M.	"	175.00
CLAY, CHINA—Am. com. ex-dock, N. Y.	lg. ton	7.75@8.00
Am. best ex-dock, N. Y.	"	9.00@9.25
English, common	"	11.00@11.25
Best grade	"	16.75
COPPERAS—Bulk	100 lb.	.47½
In bbls	"	.52½
CRYOLITE	lb.	$0.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11½@.11¾
FELDSPAR—Ground	sh. ton	9.75@10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Domestic f. o. b. shipping port.		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@ 4.50
FULLER'S EARTH—Lump	100 lb.	.80
Powdered	"	.85
GRAPHITE—		
Am. pulverized	"	45.00
Best flake	"	150.00
Ceylon, common pulv	lb.	.02¾@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
LEAD—Acetate, white	lb.	.09@.09½
Brown	"	.07@.07½
Nitrate, com'l	"	.06½
granular	"	.08¼
MAGNESITE—Greece.		
Crude (95%)	lg. ton	6.50@7.00
Calcined	sh. ton	16.50@17.00
Bricks, best imp. f.o.b N. Y.	M.	155.00
Bricks, domes, per qual., f. o.b. Pittsburg	"	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01¾
Sulphate	100 lbs.	.25@.95
MANGANESE—		
Crude powd.		
70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Ore	unit	.18 @.20
MARBLE—Flour	sh. ton	6.00@7.00
MICA—N. Y. gr'nd, coarse	sh. ton	33.00@38.00
Fine	lb.	.00½@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Litharge, Am. pow'd	"	.05½@.06
English glassmakers'	"	.08½@.08¾
Lithophone	"	.03½@.06½
Metallic, brown	sh. ton	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01½
Paris green, pure, bulk	"	.12
Red lead, American	lb.	.06½@.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.54½
White lead, Am., dry	lb.	.05@.05½
American, in oil	"	.06@.06½
Foreign, in oil	"	.09@.09½
Zinc white Am. extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06 @.08½
Green seal, dry	"	.06½@.09½
POTASSIUM—		
Bicarbonate cryst.	lb.	$0.08½
Powdered or gran	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08¼@.08½
Bromide	"	.15
Carbonate (80@85%)	"	3.50@4.00
Caustic, ordinary	"	.04½
Elect. (90%)	"	.06½
Chlorate, powdered	"	.08½@.08½
Crystals	"	.08¾@.08¾
Cyanide (98@99%)	"	.17½@.18½
Kainit	lg. ton	9.30
Manure salt 20%	100 lbs.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09½
Prussiate, yellow	"	.13½@.13½
Red	"	.35
Sulphate, 90%	100 lb.	2.11
96%	"	2.14
Sylvinit	unit	.41
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lb.	3.85@3.90
Refined	"	4.25@4.75
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, Crystals	oz.	.38½
SODIUM—		
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works.	"	3.50
Bichromate	lb.	.06¾
Bromide	"	.17
Carbonated ash, high test, in bags, f.o.b., works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 60@78%, f.o.b., works	"	1.75@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate com'l,	"	.08½@.08½
Hyposulphite, Am.	"	1.50@1.60
German	"	1.75@2.00
Phosphate	lb.	.02½@.02½
Prussiate	"	.09½@.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.65
SULPHUR—Roll	100 lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—North Carolina	sh. ton	15.50@23.50
N. Y. Fibrous best	"	10.25
French, best	"	20.00
Italian, best	"	30.00
TAR—Oil bbl. (50 gal.)	bbl.	5.25
TIN—Crystals, bbl	lb.	.21½
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic ch. pure	"	.07@.09½
Chloride solution, com'l	"	.02½
Chloride granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02@.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate(Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable

THE ENGINEERING AND MINING JOURNAL
MINING AND METALLURGY ESTABLISHED 1866

Coal and Gold.

By L. Hundeshagen.

Sumatra is an island which more than 1,400 years ago was noted for its production of gold. On the west coast I found two seams of coal in a rather quartzitic sandstone, the age of which could not yet be determined. It belongs probably to the Lower Carboniferous limestone series. In various places it is pierced by large dikes of diabase. A few hundred feet underneath the outcrop of these almost horizontal coal seams the Malay aborigines have worked a number of gold-bearing fissure-veins occurring in a diorite with very basic phases. These veins do not penetrate into the sandstone, and are consequently older. Their gangue is chiefly a pyritic quartz with some feldspathic matter. One vein (the richest in gold) is of particular scientific interest because it carries no quartz at all, the vein matter consisting entirely of a greenish garnet, without any other mineral except gold and a little silver.

When these deposits are exploited, the peculiar case will present itself of a vertical shaft intersecting, first, the coal seams and then the gold veins, 100 or 200 ft. deeper, so that both coal and gold ore can be hoisted through the same shaft. The coal, which carries much ash, contains a little gold and vanadium. The place of occurrence lies between the rivulets Lawoe and Siajoc, in the extreme southeast of the province of Tapanoeli and at an elevation of about 2,800 ft. above sea-level.

China's Copper Cash.

Two mints at Hangchau, China, one now under construction, will coin daily 2,800,000 copper *cash* of a denomination of 1, 5, 10 and 20. At present 900 *cash* are equal to a Mexican dollar, which, at 45.75c., would mean that an American cent could buy about 20 Chinese *cash*. The coins are made of copper, iron and tin, with a square hole in the center for stringing them. These single *cash* pieces, however, are gradually being superseded by the 10 and 20, which are minted largely for circulation in Ningpo to satisfy popular sentiment. The coinage of copper *cash* is very profitable.

A large part of the copper used in the minting of these coins comes from abroad, and recently substantial quantities have been ordered from America. The machinery installed at the mints is either of German or English make, and, unfortunately, inexperienced labor has lessened the service of the engines and stamps. At the new mint at Hangchau 20 stamping machines and other accessories will be installed.

The Comma; with a Suggestion.

Few persons will have failed to note the difference between written and spoken language in the matter of punctuation. When speaking we make various more or less short pauses, for the sake of emphasis or for greater clearness, that it is not always possible to represent in ordinary punctuation. This difference, while commonly recognized, is variously met by different writers. For example, suppose we have the following sentence: "On these seemingly simple measures hinge not only the life of the matte but the life of the campaign." Many writers would print this phrase just as it here stands, without any points. While they might feel that it perhaps needed some, and that in any event the reader of it would supply certain pauses, they would regard the sentence as short enough to be read "in one breath," and so (according to a primitive and not yet altogether outworn rule) needing no punctuation. Others would (and the author did) print the sentence thus, representing visually the pauses they would make in reading: "On these seemingly simple measures, hinge not only the grade of the matte, but the life of the campaign." As a matter of fact, however, if one is going to adopt the style of punctuation that indicates to the eye all the spoken pauses, he would have to introduce into that sentence yet one point more, after the word "hinge," as the reader will see for himself by reading it over aloud, as though for the benefit of an audience that was to catch every word. This would evidently give the printed sentence a very lumbering, awkward look, and have a tendency to turn the conscientious punctuator altogether on the opposite tack—that of avoiding all these troubles by omitting every point in the sentence, as it was first printed.

While this decision might be fairly satisfactory for a sentence of no great length, however, let us suppose the no-comma man to be next confronted with this sentence: "None of the replies to the question covering the percentage of lime necessary to clean the slags indicates that any particular virtue is attached to lime *per se* as a cleaner of the slag from valuable metals." As before, applying the strict rules of grammar, it is possible to omit all points here and still understand the meaning of the printed words. But the feeling of the writer of this sentence was in favor of breaking it up to the eye, and as printed the sentence had a comma after "slags" and another after "*per se*." While, as we have said, a strict interpretation of grammatic rules would have left out these commas, the weight of sympathy would probably favor their insertion. For what, after all, is the office of any punctuation? It is to make clear, or clearer, the sense intended. To carry along too far a thought without the insertion of a point compels closer attention on the part of the reader; sometimes, even, the meaning of the writer is lost to him altogether—as in the following sentence, which the writer met just as here printed, and which at first he was unable to comprehend: "The Victorian quartz-veins have received careful investigation from the early work of Selwyn and the still valuable volume of Brough Smyth to the recent monographs and papers of Messrs. Dunn, Bradford, Lidgey, etc." On the first reading, the "from" in this sentence, being a word of wide meaning, was mentally translated "by" (a common meaning). The sentence was then understandable up to the word "to," another word of wide and general meaning, when the remainder of the sentence became obscure. It was only after going back and revising the original impression received from the word "from" that the author's intention was grasped. The insertion of two commas, however, makes the sentence instantly comprehendible—one after the word "investigation," and the other after the word "Smyth." While perhaps 'grammatically' unnecessary, their omission is almost fatal to clearness.

Consider also the two sentences following: "These answers are totally at variance with each other, and yet, not in the least conflicting." "The rate of concentration was still more remarkable when one recollects, that the ore contained 34% sulphur and arsenic, being 27 tons of ore into 1 ton of matte." In these sentences, the commas after "yet" and "recollects" are 'grammatically' superfluous; but the reason for their insertion is perfectly obvious, and will be commended.

A way of meeting this difficulty would be the use of a special point—the upturned period of the printer's case; or, in other words, the borrowing of the dot from the semi-colon or the colon. These could be inserted as freely as desired, and would be read merely as 'pausing' or 'emphasis' stops, as intended. Here is an instance of a sentence helped out in this manner: "We are in receipt of late advices· to the effect that Screenwassa Kushnassami Iyengai· will shortly pay a visit to the Jenner-Quomahoning Coal Company's works· *en route* to an inspection of the plant of the Juanajuato Reduction and Mining Company." And another: "It would be of great interest to add· to the volumes that have been written on what may be done with hot blast· a few words on what has been done."

The advantages of the proposed point—for use in giving emphasis or to break up long, single-ideaed sentences—are obvious. All that is needed is the fiat of a French Academy to put the idea in force.

By the Schroeder-Grillo sulphuric acid process, 1 kilogram of platinum is sufficient for a daily production of 10 tons of sulphuric anhydride.

The Great Diamond.

This wonderful stone, recently found in the Premier mine, near Pretoria, and worth, according to the possibility of a purchaser, from $2,500,000 to $5,000,000, is described by Dr. Molengraaff in *The South African Mines, Commerce and Industries* of February 4:

THE GREAT DIAMOND—ONE SIDE.

"The big diamond is a portion of a much larger stone, the original form of which can only be roughly guessed at. Four pieces of this original stone have been broken off along cleavage planes, which we know to have the position of octahedral planes. Each of these fragments must have been of considerable size. Consequently the stone itself shows only a portion of its original natural surface (called 'nyf' in the diamond-cutters' jargon), the greater portion being formed by these four flat cleavage planes. The remaining part of the surface shows one octahedral face and a curved irregular surface roughly corresponding to six faces of the dodecahedron, while one very irregular face of the hexahedron is indicated by quadrilateral impressions which are characteristic of these faces in minerals, such as the diamond, which possesses the octahedral mode of growth.

"The stone is a single crystal, no twinning planes or twinning lamellæ being present. It is quite colorless, its perfect transparency being best compared to that of pure ice or of the variety of silica known as hyalite. There are a few grains (inclusions), and also some flaws, or internal cleavage planes—'glessen,' as the diamond-cutters call them—in it, but their position is such that they do not detract from the value of the stone as a gem. It is certainly the purest of all the very big stones known.

"The question is raised whether there is any likelihood of finding the fragments which have been detached from this stone by cleavage. It is, of course, possible, but nobody can say whether or where they will be found in the mine. Diamonds are formed at very great depths from carbon dissolved in the molten basic igneous rock (blue ground), from which, under the conditions of enormous pressure and very high temperature which prevail at these depths, the carbon crystallizes out in the form of diamond. During the period of eruption the diamonds were carried to the surface with great force, and the excessive friction which must have existed in the magma during ejection through the crater pipe caused the fragments to be cleaved from the original stone. They may have been blown out during the eruption, or they may still be in the volcanic chimney (diamond-pipe) and may be unearthed some other day in the long and promising life of this big mine."

This great diamond, which was found on January 26, has now reached London; previous to shipment it was insured at $1,250,000. It weighs 3,032 carats; the largest stone previously found in the same mine weighed 392 carats only. The accompanying photograph indicates its general appearance, and the scale, shown at one side, affords a method of measuring its size. The weight is 1.7 lb. troy, and the dimensions roughly 4 in. by 2½ by 1¼ in. Until this find was made, the biggest South African diamond was the Jagersfontein stone, which weighed 971¾ carats.

The production of the Premier diamond mine has been:

1903–4	Loads Washed.	Carats Produced.	Carats per Load.
Year to Oct. 31..	939,265	749,653	0.80
1904–5.			
November.	113,293	81,310	0.72
December	104,426	75,186	0.72
January.	99,933	77,627	0.77
February.	109,053	76,387	0.70

The accompanying illustrations are reproduced from the *Star*, of Johannesburg.

THE GREAT DIAMOND—ANOTHER VIEW.

Tantalum.

Probably all that most readers of the JOURNAL could tell offhand about tantalum is that it is used as the luciferous filament in the new Siemens and Halske incandescent electric lamp; that it used to be described in the book in that threatening footnote of close black type; and that it was unjustly named by its exasperated discoverer in allusion to some hazy mythological scamp, who was justly condemned to an eternity of teasing. All of this is true, and it is all an illustration of the close interdependence and mutual stimulation of theoretical and practical chemistry. Tantalum can really tell a connected and fascinating story. It is a rare element in the sense that it is rare to find a chemist who can analyze its compounds quickly and accurately. The peculiarly 'tantalizing' quality it has is illustrated by its somewhat whimsical solubilities. Its oxide, Ta_2O_5, and the corresponding acid, H_2TaO_4, are ambiguous in most unique and original and changeable rôles. With tantalum is associated columbium (the element that the Germans tried to name niobium), and both of these have oxides and acids that are precipitated by dilute acids, dissolved by strong acids and alkali, and that filter according to no law but one of changeable caprice. But the demands of invention have called this tantalum from the pigeon-hole of theoretical chemistry to the front row of usefulness.

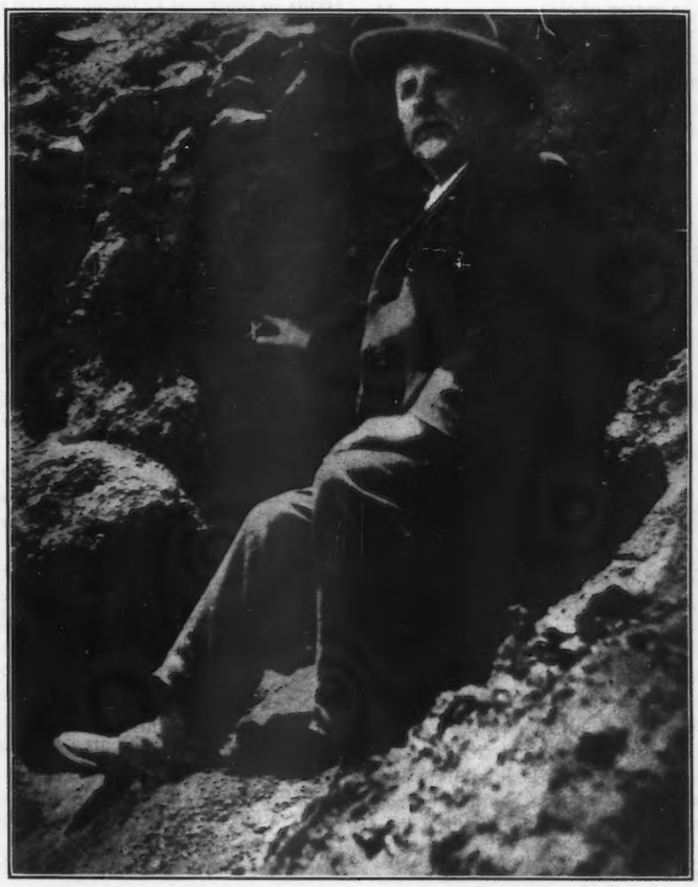
Tantalum is a gray, hard, heavy metal, with a specific gravity of 16.8 when pure and rolled; which means that it is heavier than any common metal except gold and platinum, being much heavier than silver, lead, or mercury. The only acid which will attack it is hydrofluoric, and then only when heated. It unites with hydrogen and nitrogen, even at low red heat, forming brittle metalloidal compounds. It also unites with carbon, to form carbides. The pure metal is as hard as mild steel, and a little darker than platinum. The atomic weight of tantalum is 18.3, it being the highest homologue of the vanadium-columbium-didimium group. It is in the fourth long-series of the Periodic Sequence, being in the second space after ytterbium, and immediately before tungsten. It is obtained in the metallic state by reduction of the double fluoride, K_2TaF_7, by metallic sodium, and the resulting metal is re-purified by heating in a vacuum. The metal can also be obtained by igniting the brown tetroxide of tantalum as a filament in a vacuum; but the former method is the better. We may expect to see improvement in its metallurgy.

THE PREMIER DIAMOND MINE.

A campaign of the pyrite-smelting blast-furnace lasts from 10 to 30 days.

There were 84 fatal accidents in the course of constructing the Simplon tunnel; as the great bore is a little over 12 miles long, it averages about 7 deaths to the mile.

The magnetic energy of the earth, according to recent measurements, seems to be decreasing, at the rate of 1.6% in 46 years, which may be alarming if true and permanent; but it may only be one phase of variation of long period.



MR. WELLS, THE FINDER, POINTING OUT THE SPOT WHERE THE DIAMOND WAS FOUND.

The Bed-Rock of the Gilbert River Goldfields, Quebec.*

By John A. Dresser.

The gold hitherto produced in the Province of Quebec has been taken principally from the placer deposits of the Chaudiere basin in the county of Beauce. The important deposits have been found not in the valley of the Chaudiere itself, but along its tributaries, especially the Famine, Du Loup, Gilbert and Des Plantes. Of these the Gilbert is probably the best known. It has been thought by all investigators, as far as could be ascertained, that the source of the gold is in the underlying rock, or in that of the immediate neighborhood. The bed-rock has been often described as noted for its decomposed condition and quartzose character, and in all cases has been considered to be an altered sediment.

Michel pointed out in 1866 that gold occurs in important amounts on the Gilbert, only within a quite definite area, and this opinion has been corroborated by the observation of subsequent workers. The extent of the gravels thus far known to produce gold, as pointed out to the writer last summer by Jerome Carillon, foreman of the Gilbert River Goldfields Company, coincides very closely with that indicated by Michel. Within this area exposures of the bed-rock are rare. In the channel of the Gilbert river, however, near Gilbert River Gold Mines post-office, which is about the center of this area, an accessible exposure occurs, and specimens of a similar rock are brought up from the deep diggings in which the gold is found. This rock is a variety of porphyry, a volcanic rock of the same class that underlies the gold-bearing gravels in Dudswell in the county of Wolfe, and which is the country rock of the well-known copper lodes at Eustis, Suffield and Capelton, in the township of Ascot, near Sherbrooke.

The latter is the rock of the mineralized belt which extends from Lake Memphramagog to Lake St. Francis, and includes the mines at Capelton, Eustis, Suffield and other parts of the township of Ascot, as well as portions of Stoke and Weedon. It has yielded the greater part of the copper thus far produced in the Province of Quebec. Similar rocks form a longer and larger area known as the Sutton mountain belt, some 25 miles farther to the northwest, and also occupy a third area along the boundary of the State of Maine in the vicinity of Lake Megantic. The extent of the last-mentioned occurrence is not yet at all definitely known. The volcanics in the Gilbert river area are thus some 50 miles northwest of those at Lake Megantic, and 30 northeast of the similar rocks of the Ascot belt at Lake St. Francis. The latter have hitherto been supposed to end at that point, but, from the agreement of the rocks of the Gilbert river, in position and also in petrographical character, with the rocks of the Ascot belt, they appear to be a continuation of that group.

The rocks of the Ascot and the Sutton belts belong to the porphyry-andesite series of volcanics, and seem to be frequently more acid in the vicinity of the copper deposits. They are in all cases extremely crushed, sheared and otherwise altered, and in consequence their original volcanic character has only recently been discovered. The ores which they contain are yellow, gray and purple copper, with green and blue carbonates. They frequently carry important amounts of gold, and, sometimes, of silver. Placer gold is also found in the gravels of many of the streams running over this rock, of which the best known are the Kingsley, Big Hollow, Rowe's, Willard's and Hall's brooks on the south side of Stoke mountain, in the township of Dudswell.

An interesting parallel to the relations of the gold-bearing to the other rocks, as presented on the Gilbert river, was pointed out to me by Mr. John Blue, manager at the Eustis Copper Mines. Here a hill 700 ft. high is composed of a ridge of volcanic rock 500 ft. in height, capped by 200 ft. of sediments. Gold occurs along the little brook which runs down the hill near the mine, both in the gravel and in quartz veins, up to the limit of the volcanic rock, above which none has been found. This seems to represent in miniature the conditions at the Gilbert river.

The Capelton-Eustis properties were originally developed as gold deposits, but the percentage of gold declined as lower levels were reached, while the amount of copper greatly increased. Yet gold is still a factor of appreciable value in many of these ores. It is also worthy of note that the gravels of the St. Francis river carry small amounts of gold between Lennoxville and Sherbrooke, and also at Melbourne. In the former locality the river crosses the copper-bearing volcanics of the Ascot belt, and at the latter it crosses the Sutton band, which is of similar character, and receives the discharge of some smaller streams which flow over those rocks.

On the whole, the conclusion seems to be justifiable that the placer gold of southeastern Quebec may in all cases be derived from the same series of volcanic rocks that contains the principal copper deposits of the region. Hence, it would follow that alluvial gold in this region should be looked for only in localities underlain by these volcanics, or in lower parts of the valleys of the streams which traverse, or have traversed, them; and that it may occur in any part of the area occupied by these rocks in which the conditions have been favorable to the formation and preservation of placer deposits. The occurrence of gold seems, at all events, to be a reliable indication of the proximity of copper-bearing rocks in this district.

*Paper read betore the Canadian Mining Institute, March, 1905. Published by permission of the Acting Director of the Geological Survey.

Auditing of Ore Reserves.*

By B. I. Collings.

The Transvaal Government, in estimating the present value of the Rand mines, in order to assess the profits tax, assumes that the investor will receive 7% simple interest on his money, while his original capital is returned to him by equal annual payments to a sinking fund, which is reinvested at 3%. The Government considers that a rate of 7% is necessary to induce investors to take the risk of putting money into such ventures.

The shares might be capitalized at a lower rate, if the risks could be lessened, which might be done by increasing the ore reserves, and insuring greater reliability in the estimation of their tonnage and value. The former should be carried to the point where loss of interest in capital locked up in development work counterbalances the additional security that such outlay will give. Greater reliability in the estimation of tonnage and value may be secured by a system of auditing, consisting in check measurements and samplings by independent engineers.

(We think that little exception will be taken to the advisability of check estimations, made at reasonable expense, since business interests are invariably promoted by the possession of the most precise knowledge, but we consider that there is a tendency to attempt to reduce mining investments to too fine a point, even in the case of ore deposits of such magnitude, regularity and prospective permanence as those of the Rand and Lake Superior. After all has been said and done, there remain in mining, under the most favorable circumstances, risks of contingencies that cannot be foreseen, which should be allowed for in computing the return on the investment. The system now employed by the Transvaal Government does not impress us as more conservative than it ought to be.)

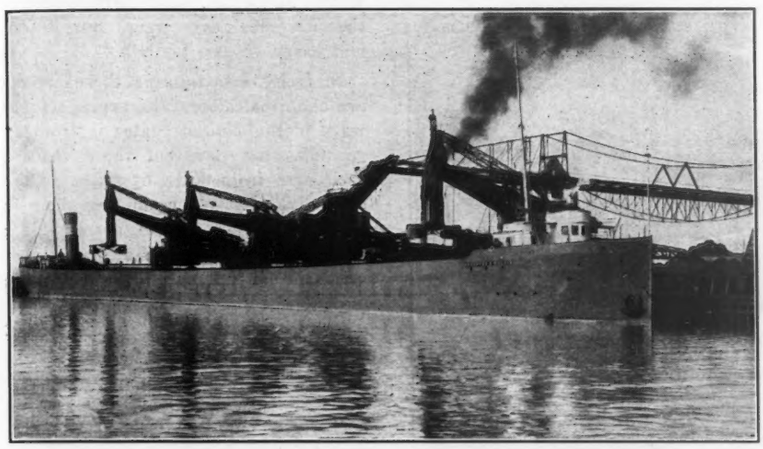
The Tantalum Lamp.—As more information comes in, it appears that the filament of the new Siemens and Halske lamp is composed of a fine wire of tantalum (about 1-400 of an inch in diameter); the resistance of the metal is low and the filament is a trifle long, being stretched on an ingenious rack in a globe of the size usual for incandescent lamps. The total weight of the filament is 22 milligrams, so that one kilogram of the metal can furnish filaments for 45,000 lamps. The standard type of 25 candle-power uses a 110-volt current at 1.5 volt per candle. One advantage is that, unlike carbon, the resistance increases with the temperature. As compared with the carbon filament, for the same candle-power and the same duration of life, and on the same voltage, the tautalum lamp uses 50% less current.

* Abstract of paper in *Journal* of the Chemical, Metallurgical and Mining Society of South Africa, December, 1904.

The Mesabi Iron Ore Range.—VIII.

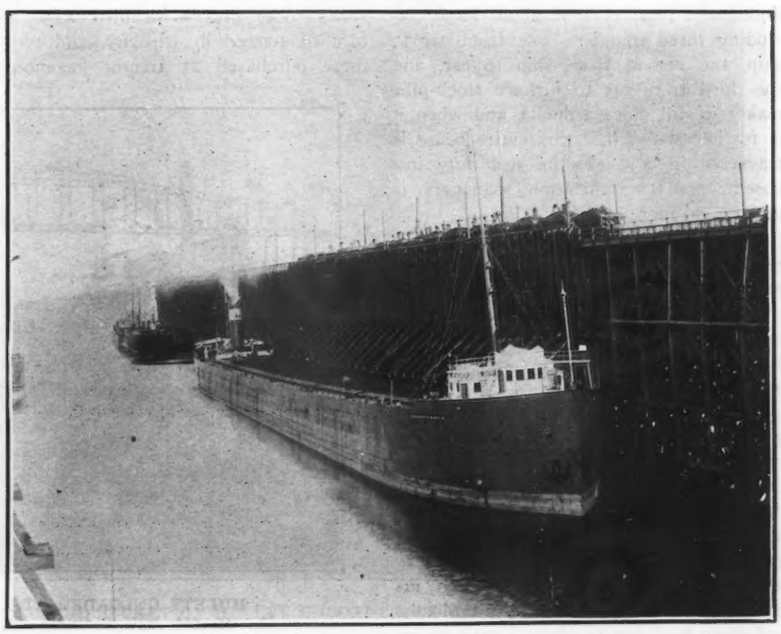
By Dwight E. Woodbridge.

Mesabi ores reach the lake on their way to furnaces by a system of transportation that is not excelled in results nor surpassed for economy of operation. Three railways handle the product of the range, and their shipping seasons are of from 225 to 240 days' duration. In that period they must move to docks on Lake Superior, at Duluth and Two Harbors, Minn., and Superior, Wis., an average of from 60,000 to 80,000 tons a day, and it is not an unusual occurrence for one road to handle 1,000,000 tons a month at the height of the season. The business to be done during the season of 1905 will be, doubtless, considerably in excess of any figures yet attained.



FOUR HULETT UNLOADERS AT CONNEAUT DOCKS.
This group has unloaded 7,257 tons of iron ore in 4½ hours.

In order to reach the tonnage necessary, and the costs requisite for the continued enlargement of the steel trade of the United States, it is essential that ore handling be as nearly automatic as possible, for the value of the ore, being a low-priced mineral, rests in great measure upon its cost at destination. From the time it is loaded into a car at mine till it rests in the hold of a ship beside some great ore pier, its progress is almost without the touch of human hand. The present accepted type of ore-car is a drop-bottom hopper, capable of carrying 100,000 lb. or more. As this car comes to rest over its proper pocket in the shipping pier, its hinged bottom is let fall and the ore drops into the receptacle prepared for it. From this it is permitted to slide through a long chute into the hold of the capacious ship waiting to receive its load. If the ore be heavy, sticky and slow of motion, a gang of men armed with long steel-shod poles prod it through the car, and the same men will later aid it in running through the door at the base of the dock pocket to the ship. One man, standing strapped to the side of the dock at the height of the hinge-hole, or base of the pocket, assists in the operation. Not long ago the ore-ship was of a size and build that necessitated the trimming of her cargo—that is, the shoveling of the load below decks until the vessel stood on an even keel and no storms could shift any of the load. But that was found unnecessary, and has been abandoned in more modern ships; all the trimming needed is now given by a series of steel plates that are lowered into the hold and deflect the stream of ore coming from the chutes to either side of the vessel. Trimming is still the practice with grain cargoes, and is an expense of 2.5c. a ton that ore does not pay.

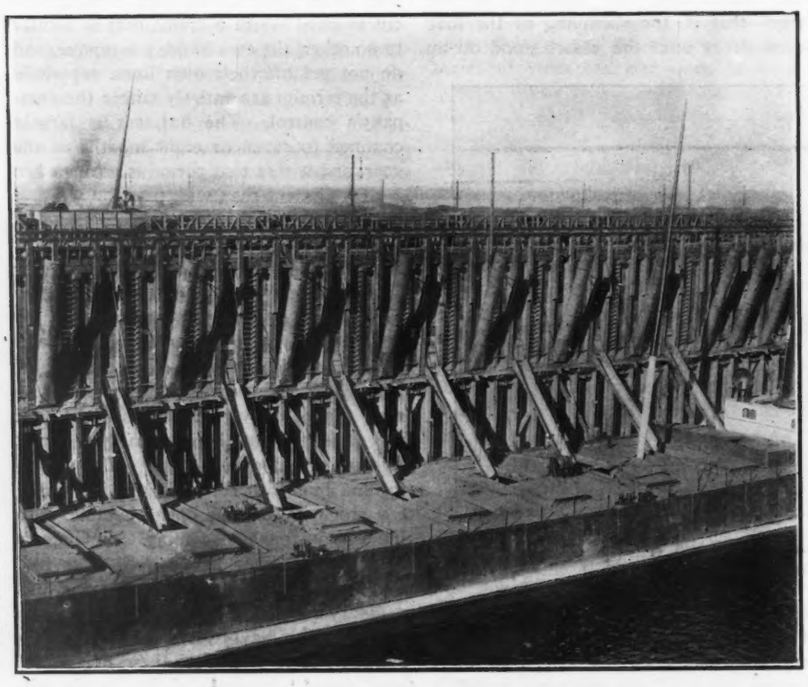


ORE VESSEL LOADING AT DULUTH.

In many respects ore traffic by rail to upper lake ports is an abnormal business. It is one-way, and the revenue cannot be judged by the same standards that apply to roads doing a general merchandise business both ways. With ore-cars going one way light, their car-mileage earnings are cut in two. With a traffic that is similar to no other, the cars in use are unique, and do not get off their own lines, especially as the termini are entirely within the company's control. The business is largely confined to seven or eight months of the year, and within that period is governed to a larger extent than with most by weather conditions. A storm at the lower end of Lake Superior, that may force scores of ships to lie behind Whitefish point, or some severe weather on lakes Huron or Erie, that causes vessels to come up bunched in large and unwieldy groups, will give immediate trouble on the roads. This backs right up to the mines. If the road cannot deliver ore at docks because the ships are not there to carry it away, its cars are at once delayed. The underground mine can continue hoisting, for it can stockpile, but the open-pit mine, with its heavy tonnage coming from steam shovels, must immediately close down. All these things bring up problems from which ordinary railroading is free. It is utterly impossible to have dock storage capacity sufficient to take care of these delays. A road doing a business of five or six million tons in eight months will not provide a storage capacity for more than, say, 150,000 to 200,000 tons. This is allotted to mines according to their expected shipments, a schedule for the probable business from every mine being available at the beginning of the season. A mine that is expected to ship a million tons will be allotted dock space of from 30,000 to

35,000 tons, and this has been found ample. All its ore will be put into certain pockets covering this tonnage.

To carry the ore a distance of 1,200 miles to furnaces, first by rail, then by water, and once more by rail, is a task of no mean proportions. That it can be done at a total cost of about $2.30, including three transfers, one from car to ship, the second from ship to car, and the third from car to furnace stock-pile, makes it still more arduous, and when it is further stated that this entire route is traversed in a week, the full duty imposed upon transportation managers is understood more clearly.



DULUTH, MISSABE & NORTHERN ORE DOCK.

At the height of the ore season daily receipts at docks frequently reach 60,000 to 65,000 tons for a single road.

The effort of railway managers is to increase the train tonnage by the substitution of cars carrying greater loads in proportion to their weights, by heavier locomotives, and by the reduction of grades against traffic. One road, the Duluth & Iron Range, suffers more from these adverse grades than do either of the others, for it was built through the more westerly region, where the topographical influence of Lake Superior was less felt. All the roads have been increasing their average one-way train loads, and these now run to about 1,200 tons on the Duluth & Iron Range, and 2,000 tons on the Duluth, Missabe & Northern and the Great Northern. This looks big, but it must be remembered that this is one-way, and that the equipment goes back to mines empty, thus diminishing by 50% the average train load. On all roads the present train loads show an increase of about 10% in the past three years, based on the same motive power. The tendency is toward a further increase, as the roads adopt exclusively the steel car, and put on heavier engines. This is shown in orders for equipment given the winter of 1904-5. For the three Mesabi range roads these orders included 2,150 steel cars of 100,000 lb. capacity, and two of these purchased 21 freight locomotives, weighing 165,000 to 170,000 lb. on the drivers, and about 325,000 lb. for engine and tender in working order. These are the heaviest locomotives ever put into service in this part of the country. The smaller wooden cars, carrying loads of from 25 to 35 gross tons, are being discarded as their repair bills increase, and will soon be entirely eliminated. It is an interesting fact that it was but 30 years ago when the standard type of ore-car on Lake Superior held 8 tons. The increase in percentage of revenue to gross load since then has been marked. At that time the revenue load was less than 50% of the total. The 30-ton wooden cars weigh 24,000 lb., and carry 60,000, and the new steel cars weigh but 30,000 lb. and carry 100,000 pounds.

In freight-car mileage these ore roads are abnormal also. The average for railways in the United States is from 15 to 20 miles per day, but these roads run their cars from 60 to 65 miles. The peculiar conditions surrounding their business, already referred to, permit this, and by so doing diminish greatly the fixed investment in rolling stock requisite for moving a specified tonnage.

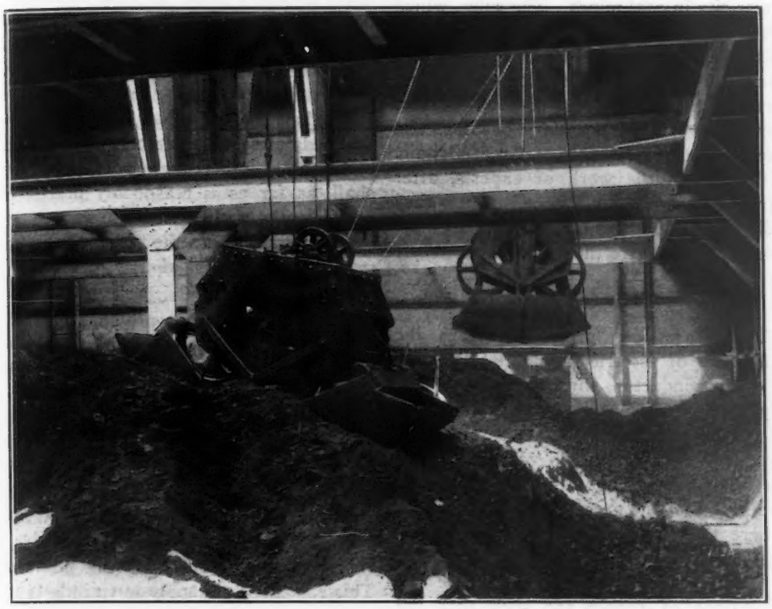
But it is in their density of traffic that these roads present most striking comparisons. With a business of from 40,000 to 45,000 tons a day, between mines and docks, there must be, say, 35 trains traversing the road daily, and as the business is confined to 18 to 20 hours of the 24, this means that there are trains passing up or down every 30 minutes. And these are no light trains of toy loads. Headed by locomotives larger than any used in the United States, aside from a few mountain divisions, and hitched to 2,000 to 2,500 tons of load, these trains are hurled at speed over their long lines, up and down grades, and with one close behind another, it is a work for men with nerve and courage.

All ore is weighed at terminal yards on special Fairbanks scales, automatic for two of the roads, by hand mechanism on the other. There seems no advantage in hand weighing, while automatic work avoids the factor of error on the part of some possibly careless individual. Ore-cars are 24 ft. long over all, with a 19-ft. wheel-base, and the time of weighing is

HULETT UNLOADER AT LACKAWANNA WORKS, BUFFALO.
Movable conveyor-bridge with buckets for rehandling ore from stock

limited to the period during which the train passes 5 ft., that is from the instant the rear wheels rest on the scale until the forward wheel truck leaves it. Trains are moved along steadily over the scale at the rate of 15 min. for length of train, or less than 5 sec. for weighing period per car. In this time the weight is made and printed on an automatic recorder in the scale mechanism. The scale is a simple modification of the old-fashioned steelyard, with levers reducing the weight 400 times. The accuracy of these scales is remarkable. In innumerable tests an error greater than 50 lb. per car, or 1-2,000, is of exceeding rarity, and it has been found that this error has so nearly corrected itself for a train-load that in gross for the full train it is proportionately far less. The Duluth, Missabe & Northern is now placing at its Proctor yards the first all-steel automatic train scale so far set up. The roads maintain duplicate sets of scales, and the company installing them is under contract to inspect and test them at frequent intervals. These scales are of especial importance, as they not only serve to make the base for railway weights, on which, in 1904, $8,400,000 were paid the roads, but are the foundation for computing royalty payments for all fee-owners, public and private, amounting to millions more.

In the year 1872, the railway system for the Lake Superior iron trade was "completed," as was then announced by the building of the Chicago & Northwestern to Escanaba, and the consolidation of the Marquette & Ontonagon and the Houghton & Ontonagon and their extension as far as L'Anse, thus establishing railway communication from Chicago to the head of Keewenaw bay on Lake Superior. The consolidated road had an ore-shipping pier at Marquette, and that year built a second at L'Anse. The former was the beginning of the system that has since become the ore terminus of the Duluth, South Shore & Atlantic, and the latter was long ago abandoned, and was recently destroyed. Thirty years ago the L'Anse dock was the most modern pier in existence. It was 546 ft. long, and built on 43 bents of piling. It was 36 ft. wide, and 38 ft. high. Each pocket held about 75 tons of ore, and the capacity of the entire dock was 6,000 tons. The base of the pockets—that is, the height of hinge-hole—was 20 ft. above water. As ore slides by gravity from pocket to ship's hold, the hinge-hole, to which chute is attached, must be so high above the vessel's side that ore will readily slide down the chute. So low were the decks of the ships of 30 years ago that a height of 20 ft. was ample to give sufficient inclination to the chute. Docks of today have their hinge-holes 40 ft. above water level.



HULETT UNLOADING BUCKET IN VESSEL WITH BETWEEN-DECK STANCHIONS.

In the older days referred to, operations were at such a rate of speed that it is recorded that 6,000 tons were shipped in a single day, and that one vessel, of 476 tons, was loaded, marvelous to relate, in 75 min. At that time the average capacity of ships was about 650 tons, ranging from 400 to 1,100 tons.

In 1904 the great ship *Augustus B. Wolvin,* then the largest ship on the lakes, loaded 10,245 gross tons of ore in 89 min. at the Great Northern ore docks, and was at dock a total period of 180 min. Nine thousand tons of this load were put on in 34 min. The same year the ship *J. H. Peavey* loaded 6,585 gross tons in 51 min., and the preceding season the *J. H. Hoyt* loaded 5,250 tons in 30.5 minutes.

The modern ore-shipping pier is not the least complex and interesting factor in the transportation situation. Its foundation is frequently 40 ft. below water level, and consists of a series of piling that cannot have much cross-bracing until the surface of the water is reached. Above the water there is a height of 60 to 70 ft. more, and away on top of this is the enormous moving load of trains and locomotives, for an average of which 4,000,000 lb. is a low estimate. Air-brakes on the cars stop them in a yard or two, and there is a pressure of up to 2,500,000 foot-pounds to be taken up every time a train stops, or hundreds of times daily,

LEG AND BUCKET OF HULETT UNLOADER AT WORK IN HOLD OF "WOLVIN."

by the longitudinal bracing of the pier. Added to this is the fact that the center of permanent load may be 90 to 95 ft. above foundations. Docks require an enormous amount of timber, probably from 6,000,000 to 10,000,000 ft. for an average pier at Duluth, and problems met by the construction engineeer are serious. The demand is, on the one hand, for more bracing, and on the other for less severe switching and lighter locomotives at docks.

All three of the iron-ore roads of Minnesota are practically double-track lines, and their combined equipments include 140 freight locomotives and 9,800 ore-cars of from 25 to 50 tons capacity. The three have a combined mileage of about 500 miles, and the cost of these roads, with their specialized terminals, rolling-stock and equipment, has been in the neighborhood of $45,000,000.

Average shipments and maximum daily movement over docks of the Duluth, Missabe & Northern for the past 10 years have been as follows:

YEAR.	Average Season Tonnage	Total Time Loading.	Time Per 1,000 Tons.	Maximum Daily Shipment.
1895	1,809	4:00	2:13	.....
1896	2,214	5:16	2:24	.....
1897	3,541	7:40	2:10	41,191
1898	3,550	8:10	2:07	51,052
1899	3,803	7:24	1:57	48,703
1900	3,783	6:31	1:43	57,783
1901	4,459	5:57	1:20	63,960
1902	4,814	7:09	1:29	78,592
1903	5,668	8:47	1:33	65,758
1904	5,670	8:00	1:24	68,723

The following statement gives statistics of docks at present handling ore at the head of Lake Superior, for the product of the Mesabi and Vermilion ranges, and the comparisons between this old L'Anse pier and those of today are not the least instructive to be found in the upper lake iron-ore trade.

RAILWAY.	Number of Pockets.	Storage Capacity Tons.	Height, to Hinge-Hole.	Height, to Deck of Dock.	Width of Dock.	Length of Dock.
Duluth & Iron Range.	202	40,400	35′–5	59′–6	49′–0	1,388′
" " " "	208	41,600	33′–5	57′–6	49′–0	1,280′
" " " "	170	40,000	40′–0	66′–0	49′–0	1,020′
" " " "	168	36,960	37′–0	62′–0	49′–0	1,112
" " " "	168	33,600	30′–0	54′–6	49′–0	1,112′
Duluth, Missabe & Northern	384	57,600	30′–0	53′–0	49′–0	2,336′
" " " "	384	69,120	32′–0	57′–6	49′–0	2,336′
" " " "	384	80,640	40′–7	67′–½	59′–0	1,152′
Great Northern	250	40,500	32′–0	57′–0	49′–8	1,525′
" "	350	87,500	40′–0	73′–0	62′–8	2,100′
" "	160	40,000	40′–0	73′–0	62′–8	960′

Thin films of iron transmit light that is gray; they are made by the so-called "ionoplastic method, in which the iron is deposited by cathode disintegration."

Metallic cerium can be obtained by the electrolysis of the fused cerous-chloride. There is great liability of forming a carbide, or oxide, or even of an oxy-carbide $O_4Ce_3C_2$; the simple carbide of cerium is brown.

The contact-process for the manufacture of sulphuric acid is said to be on trial at zinc works in Wisconsin.

Regulations for Electricity in Coal Mines.

The British Home Office has submitted to the coal-mine operators of Great Britain a new code of rules governing the use of electricity in coal mines. The rules, which are based on the recommendations contained in the Report of the departmental committee on the use of electricity in mines, have been agreed upon in their present form between the Secretary of State and the Mining Association of Great Britain. As they are the work of experts, after careful consideration of the subject, they will be of interest to coal operators everywhere, and we give them, therefore, nearly in full.

DEFINITIONS.

The expression "pressure" means the difference of electrical potential between any two conductors through which a supply of energy is given, or between any part of either conductor and earth as read by a hot wire or electrostatic volt-meter, and (*a*) Where the conditions of the supply are such that the pressure at the terminals where the electricity is used cannot exceed 250 volts, the supply shall be deemed a low-pressure supply. (*b*) Where the conditions of supply are such that the pressure at the terminals where the electricity is used, between any two conductors, or between one conductor and earth, may at any time exceed 250 volts, but cannot exceed 650 volts, the supply shall be deemed a medium-pressure supply. (*c*) Where the conditions of the supply are such that the pressure at the terminals where the electricity is used, between any two conductors, or between one conductor and earth, may at any time exceed 650 volts, but cannot exceed 3,000 volts, the supply shall be deemed a high-pressure supply. (*d*) Where the conditions of supply are such that the pressure at the terminals where the electricity is used, between any two conductors, or between one conductor and earth, may at any time exceed 3,000 volts, the supply shall be deemed an extra high-pressure supply.

SECTION I.—GENERAL.

1. (*a*) All electrical apparatus and conductors shall be sufficient in size and power for the work they may be called upon to do, and, so far as is reasonably practicable, efficiently covered or safeguarded, and so installed, worked and maintained as to reduce the danger through accidental shock or fire to the minimum, and shall be of such construction, and so worked that the rise in temperature caused by ordinary working will not injure the insulating materials. (*b*) In any place or part of a mine where gas is found, the covering shall be constructed so that there is no danger of firing gas by sparking or flashing which may occur during the normal or abnormal working of the apparatus. (*c*) All metallic coverings, armoring of cables, other than trailing cables, and the frames and bedplates of generators, transformers, and motors other than portable motors shall, as far as is reasonably practicable, be efficiently earthed where the pressure at the terminals where the electricity is used exceeds the limits of low pressure, as above defined.

2. Where a medium-pressure supply is used for power purposes, or for arc lamps in series, the wires or conductors forming the connections to the motors, transformers, arc lamps, or otherwise in connection with the supply, shall be completely inclosed in strong armoring or metal casing efficiently connected with earth, or they shall be fixed at such a distance apart, or in such a manner that danger from fire or shock may be reduced to the minimum. This rule shall not apply to trailing cables.

3. Where a medium-pressure supply is used for incandescent lamps in series, the wires or conductors forming connections to the incandescent lamps or otherwise in connection with the supply, shall be completely inclosed in strong armoring or metal casing efficiently connected with earth, or they shall be fixed at such a distance apart, or in such a manner that danger from fire or shock shall be reduced to the minimum.

4. Motors of coal-cutting and such other portable machines shall not be used at a pressure higher than medium pressure. No transformer used for supplying current at a pressure higher than medium pressure, and no motor using such current, shall be of less normal rating than 20 brake h.p. for use underground. No higher pressure than a medium pressure shall be used in any place or part of the mine where gas is found.

5. No higher pressure than a medium-pressure supply shall be used other than for transmission or for motors, and the wires or conductors other than overhead lines above ground forming the connections to the motors or transformers, or otherwise in connection with the supply, shall be completely inclosed in a strong armoring or metal casing efficiently connected with earth, or they shall be fixed at such a distance apart, or in such a manner that danger from fire or shock shall be reduced to the minimum. The machines, apparatus and lines shall be so marked as to clearly indicate that they are high pressure, either by the use of the word "Danger" at frequent intervals, or by red paint properly renewed when necessary.

6. The insulation of every complete cir-

cuit other than telephone or signal wires used for the supply of energy, including all machinery, apparatus, and devices forming part of or in connection with such circuit, shall be so maintained that the leakage current shall not exceed 0.001 of the maximum supply current, and suitable means shall be provided for the immediate localization of leakage.

7. In every completely insulated circuit, earth- or fault-detectors shall be kept connected up in every generating and transforming station, to show immediately any defect in the insulation of the system. The readings of these instruments shall be recorded daily in a book kept at the generating or transforming station or switch-house.

8. Main and distribution switch- and fuse-boards must be made of incombustible insulating material, such as marble, or slate free from metallic veins, and be fixed in as dry a situation as practicable.

9. Every sub-circuit must be protected by a fuse on each pole. Every circuit carrying more than 5 ampères up to 125 volts, or 3 ampères at any pressure above 125 volts, must be protected in one of the following alternative methods: (*a*) By an automatic maximum cut-out on each pole. (*b*) By a detachable fuse on each pole, constructed in such a manner that it can be removed from a live circuit with the minimum risk of shock. (*c*) By a switch and fuse on each pole.

10. Fire-buckets, filled with clean, dry sand, shall be kept in electrical machine rooms, ready for immediate use in extinguishing fires. No repair or cleaning of the live parts of any electrical apparatus except mere wiping or oiling shall be done when the current is on. Gloves, mats, or shoes of india-rubber or other non-conducting material shall be supplied and used where the live parts of switches or machines, working at a pressure exceeding the limits of low pressure, have to be handled for the purpose of adjustment.

11. A competent person shall be on duty at the mine when the electrical apparatus or machinery is in use; and at such time as the amount of electricity delivered down the mine exceeds 200 brake h.p., a competent person shall be on duty at the mine above ground, and another below ground. Every person appointed to work any electric apparatus shall have been instructed in his duty and be competent for the work that he is set to do.

12. No person shall wilfully damage, interfere with, or without proper authority remove or render useless any electric line or any machine, apparatus, or part thereof, used in connection with the supply or use of electricity.

13. Instructions shall be posted in every generating, transforming, and motor house containing directions as to the restoration of persons suffering from electric shock.

14. Direct telephonic or other equivalent means of communication shall be provided between the surface and the pit bottom or main distributing center in the pit.

15. Within three months after the introduction into any mine of electric motive power, notice in writing must be sent to the inspector of mines for the district. Notice must also be sent of any existing electric motive-power installation at any mine within three months after the coming into force of these rules.

16. A plan shall be kept at the mine showing the position of all permanent electrical machinery and cables in the mine, and shall be corrected as often as may be necessary to keep it up to a date not more than three months previously.

SECTION II.—GENERATING STATIONS AND MACHINE ROOMS.

1. Where the generating station under the control of the owner or manager of the mine is not within 1,200 ft. of the working-pit mouth, an efficiently inclosed locked switch-box, or boxes, or a switch-house, shall, where reasonably practicable, be provided near the pit mouth, for cutting off the supply of electricity to the mine.

2. There shall be a passageway in front of the switchboard of not less than 3 ft. in width, and if there are any connections at the back of the switchboard, or any passageway behind, the switchboard shall not be less than 3 ft clear. This space shall not be utilized as a storeroom or a lumber-room, or obstructed in any manner by resistance frames, meters, or otherwise. If space is required for resistance frames or other electrical apparatus behind the board, the passageway must be widened accordingly. No cable shall cross the passageway at the back of the board except below the floor, or at a height of not less than 7 ft. above the floor. The space at the back of the switchboards shall be properly floored, accessible from each end, and, except in the case of low-pressure switchboards, must be kept locked, but the lock must allow of the door being opened from the inside without the use of a key. The floor at the back shall be incombustible, firm and even.

3. Every generator shall be provided with a switch on each pole between the generator and the bus-bars. Where continuous-current generators are paralleled, reversed current cut-outs shall also be provided. Instruments shall be provided for measuring the current and pressure of each generator. Every feeder circuit shall have at its origin an ammeter.

4. If the transmission lines from the generating station to the pit are overhead, there shall be lightning arresters in connection with the feeder circuits.

5. Automatic cut-outs must be arranged so that when the contact lever opens outwards, no danger exists of striking the head of the attendant. If uninclosed fuses are used, they must be placed within 2 ft. of the floor, or be otherwise suitably protected. Where the supply is at a pressure exceeding the limits of medium pressure, there shall be no live metal work on the front of the main switchboard within 8 ft. of the floor or platform, and the space provided under Rule No. 2 of this section shall be not less than 4 ft. in the clear. Insulating floors or mats shall be provided for medium-pressure boards where live metal work is on the front or back.

6. All terminals and live metal on machines over medium pressure above ground, and over low pressure under ground, where practicable shall be protected with insulating covers or with metal covers connected to earth.

7. No person other than an authorized person shall enter a machine or motor room, or interfere with the working of any machine, motor, or apparatus connected therewith.

SECTION III.—CABLES.

1. All conductors (except as hereinafter provided) shall in every case be maintained completely insulated from earth, but it is permissible to use the concentric system with earthed outer conductor, if proper arrangements are made to reduce the danger from fire or shock to the minimum, but the neutral point of polyphase systems and the middle wire of three-wire continuous-current systems may be earthed at one point.

2. Unless fixed as far as is reasonably practicable out of reach of injury, all conductors, other than armored cables, must further be protected by a suitable covering. Where lead-covered cable is used the lead shall be earthed, and electrically continuous throughout. The exposed ends of cables, where they enter the terminals of switches, fuses, and other appliances, must be properly protected and finished off, so that moisture cannot creep along the insulating material within the waterproof sheath, nor can the insulating material, if of an oily nature, leak out of the cable.

3. All joints must be mechanically and electrically efficient, and, where reasonably practicable, must be suitably soldered. In places where gas exists, suitable joint-boxes must be used, and the conductors connected by means of metal screw clamps, connectors, or their equivalent, constructed in a safe manner. Provided that in any place or part of a mine where a shot may be fired, joints may be soldered by or in the presence of a person authorized in that behalf by the manager, but with strict precautions in regard to examination and removal of workmen, and, where the place is dry and dusty, with precautions as to watering. Wires, other than signaling wires, or cables must not be joined by merely twisting them together.

4. Overhead bare wires on the surface must be efficiently supported upon insulators, and clear of any traffic, and provided with efficient lightning arresters.

5. All cables used in shafts must be highly insulated and substantially fixed. Shaft cables, not capable of sustaining their own weight, shall be properly sup-

ported at intervals varying according to the weight of the cable. Where the cables are not completely boxed in and protected from falling material, space shall be left between them and the side of the shaft that they may yield and so lessen a blow given by falling material.

6. Where the cables in main haulage roads cannot be kept at least 1 ft. from any part of the tub or tram, they shall be specially protected. When separate cables are used, they shall, if reasonably practicable, be fixed on opposite sides of the road. The fixing with metallic fastenings of cables and wires not provided with metallic covering to walls or timbers is prohibited. Cables underground, when suspended, shall be suspended by leather or other flexible material in such a manner as to allow of their readily breaking away when struck, before the cables themselves can be seriously damaged. Where main or other roads are being repaired, or blasting is being carried out, suitable temporary protection must be used so that the cables are reasonably protected from damage.

7. Trailing cables for portable machines shall be specially flexible, heavily insulated, and protected with either galvanized steel-wire armoring, extra stout braiding, hose pipe, or other effective covering. Trailing cables shall be examined at least once in each shift by the person in charge of the machine, and any defects in them promptly repaired. At points where the flexible conductors are joined to the main cables, a fixed terminal box must be provided, and a switch shall be fixed close to or in the terminal box, capable of entirely cutting off the supply from the terminal box and motor.

SECTION IV.—SWITCHES, FUSES AND CUT-OUTS.

1. Fuses and automatic cut-outs shall be so constructed as effectually to interrupt the current when a short circuit occurs, or when the current through them exceeds the working current by 200%. Fuses shall be stamped or marked, or shall have a label attached, indicating the current with which they are intended to be used, or where fuse wire is used, each coil in use shall be so stamped or labeled. Fuses shall be adjusted or replaced only by an authorized person.

2. All live parts of switches, fuses and cut-outs not in machine rooms, or in compartments specially arranged for the purpose, must be covered. These covers must be of incombustible material, and must be either non-conducting or of rigid metal, and, as far as practicable, clear of all internal mechanism.

3. All points at which a circuit other than those for signals has to be made or broken shall be fitted with proper switches. The use of hooks or other makeshifts is prohibited, and in any place where gas is known to exist the use of open-type switches, fuses and cut-outs is prohibited; they must either be inclosed in gas-tight boxes, or break under oil.

SECTION V.—MOTORS.

1. All motors, together with their starting resistances, shall be protected by switches capable of entirely cutting off the pressure, and fixed in a convenient position near the motor, and every motor of 10-brake h.p., or over, in a machine room underground shall be provided with a suitable ammeter to indicate the load put upon the machine.

2. Where unarmored cables or wires pass through metal frames or into boxes or motor casings, the holes must be substantially bushed with insulating bushes, and, where necessary, with gas-tight bushings which cannot readily become displaced.

3. Terminal boxes of portable motors must be securely attached to the machine, or be designed to form a part thereof.

4. In any place where gas is found, all motors, unless placed in such rooms as are separately ventilated with intake air, shall have all their current-carrying parts, also their starters, terminals, and connections, completely inclosed in flame-tight inclosures, made of uninflammable material, and of sufficient strength not to be liable to be damaged should an explosion of firedamp occur in the interior; and such inclosures shall not be opened except by an authorized person, and then only when the current is switched off. The pressure shall not be switched on while the inclosures are open.

5. In any place where gas is found, a safety lamp or other suitable apparatus for the detection of firedamp shall be provided for use with each machine when working, and should any indication of firedamp appear on the flame of the safety lamp or other apparatus used for the detection of firedamp, the person in charge shall immediately stop the machine, cut off the current at the gate end or nearest switch, and report the matter to an official of the mine.

6. (*a*) A coal-cutter motor shall not be kept continuously at work for a period of time exceeding a maximum, which shall be specified in writing by the manager, so that the roof may be thoroughly examined. (*b*) The casing or inspection doors of all portable motors used underground, and the casing of their switches and other appliances, shall at least once a week be opened by a competent person appointed by the manager, and the parts so disclosed shall be cleaned and examined before the coverings are replaced. In special cases requiring a motor to run continuously longer than one week, the motor shall be examined at the end of the run. A report of such examination shall be entered in a report book.

7. The person in charge of a coal-cutter or drilling machine shall not leave the machine while it is working, and shall, before leaving the working place, see that the current is cut off from the trailing cables. He must not allow the cables to be dragged along by the machine. No repairs shall be made to any portable machine until the pressure has been cut off from the trailing cables.

8. If any electric sparking or arc be produced outside a coal-cutting or other portable motor or by the cables or rails, the machine shall be stopped, and not be worked again until the defect is repaired, and the occurrence shall be reported to an official of the mine.

SECTION VI.—ELECTRIC LOCOMOTIVES.

1. Electric haulage by locomotives by the trolley-wire system is not permissible in any place where gas is found. On this system no pressure exceeding the limits of medium pressure may be employed.

2. In underground roads the trolley wires must be placed so that they are at least 7 ft. above the level of the road or track, or elsewhere, if sufficiently guarded, or the pressure must be cut off from the wires during such hours as the roads are used for traveling on foot in places where trolley wires are fixed. The hours during which traveling on foot is permitted shall be clearly indicated by notices and signals placed in a conspicuous position at the ends of the roads. At other times no one other than a duly authorized person shall be permitted to travel on foot along the road. On this system either insulated returns or uninsulated metallic returns of low resistance may be employed.

3. In order to prevent any other part of the system being earthed (except when the concentric system with earthed outer conductor is used) the current supplied for use on the trolley wires with an uninsulated return shall be generated by a separate machine, and shall not be taken from or be in connection with electric lines otherwise completely insulated from earth.

4. If storage-battery locomotives are used in places where gas exists, the rules applying to motors in such places shall also be deemed to apply to the boxes containing the cells.

SECTION VII.—ELECTRIC LIGHTING.

1. All arc lamps shall be so guarded as to prevent pieces of ignited carbon falling from them, and shall not be used in situations where there is likely to be danger from the presence of coal dust. They should be so screened as to prevent risk of contact with persons.

2. Small wires for lighting circuits must be either conveyed in pipes or casings, or suspended from porcelain insulators, or tied to them with some non-conducting material which will not cut the covering, and so that they do not touch any timbering or metal work. On no account must staples be used. If metallic pipes are used they must be electrically continuous and earthed. If separate uncased wires are used they must be kept at least 2 in. apart, and not brought together except at lamps or switches or fittings.

3. In places where gas exists, electric lamps, if used, must be of the vacuum or inclosed type; they shall be protected by gas-tight fittings of strong glass, and have no flexible cord connections, and shall be changed only by a duly authorized competent person. While the lamps are being changed the current shall be switched off.

4. In all machine rooms and other places underground where a failure of electric light is likely to cause danger, some safety lamps, or other proper lights, shall be kept for use in the event of such failure.

SECTION VIII.—SHOT-FIRING.

1. Electricity from lighting or power cables shall not be used for firing shots, except in sinking shafts or stone drifts, and then only when a special firing plug, button, or switch is provided, which plug, button, or switch shall be placed in a fixed box, and shall only be accessible to the authorized shot-firer. The firing cables or wires shall not be connected to this box until immediately before it is required for the firing of shots, and shall be disconnected immediately after the shots are fired. When shot-firing cables or wires are used in the vicinity of power or lighting cables, sufficient precautions shall be taken to prevent the shot-firing cables or wires from coming in contact with the lighting or power cables.

SECTION IX.—SIGNALING.

1. All proper precautions must be taken to prevent electric signal and telephone wires from coming into contact with other electric conductors, whether insulated or not.

2. Contact makers or push buttons of electric signaling circuits shall be so constructed and placed as to prevent the circuit being accidentally closed.

3. In gaseous parts of a mine, bare wires shall not be used for signaling circuits except in haulage roads, and the pressure shall not exceed 15 volts in any one circuit.

SECTION X.—ELECTRIC RE-LIGHTING OF SAFETY LAMPS.

1. In gaseous or fiery mines, when safety lamps are re-lighted underground by electricity, the manager shall select a suitable station or stations, which are not in the return airway, and in which there is not likely to be any accumulation of inflammable gas; and no electric re-lighting apparatus shall be used in any other place. All electrical re-lighting apparatus shall be securely locked, so as not to be available for use except by persons authorized by the manager to re-light safety lamps, and such persons shall examine all safety lamps brought for re-lighting before they are re-issued.

Tantalum unites with oxygen, selenium, tellurium, nitrogen and carbon. It alloys with iron, silver, molybdenum and tungsten, but does not form an amalgam with mercury.

Barytes Mining in Virginia.

The barytes mines in Virginia lie principally on or near the line of the Southern Railway in the counties of Campbell and Pittsylvania, although some deposits of inferior quality have been found farther north and in the western part of the State. The best mines are those in Pittsylvania county, owned or controlled by the Nulsen, Klein & Krausse Manufacturing Company, no other mines producing such a high grade of ore, except those near Evington, Va., which were formerly operated by the same company, but recently abandoned because the ore was exhausted or too expensive to mine.

Barytes in this part of Virginia lies in pockets or kidneys with smaller veins or seams, and dips at an angle of 40° or 45°. The different mines, or deposits, are found almost on a geographical line running northeast-southwest.

The deposit is first located by surface indication, and the mining is done by sinking a vertical timbered shaft, equipped with a steam hoist, rope and bucket, and when the vein is reached, timbered drifts or horizontal levels are run, following the lead of the ore; from these the ore is taken out and raised to the surface through the vertical shaft.

The ore lies between two walls which are from 10 to 60 ft. apart; the top or hanging-wall is usually sandstone or slate, and the bottom or foot-wall is limestone or hard rock; the ore is imbedded in black dirt, or red clay.

The prosecution of this industry has given employment to a large number of country folks from the neighborhood, and has proved a boon to many poor farmers who have been fortunate enough to find such a source of revenue upon their unproductive land. The royalty usually ranges from 50c. to $1 per ton. Owners have also an opportunity to dispose of wood for timbering at a much better price than could otherwise be obtained.

Sodium Langbeinite.

Experiments conducted from the standpoint of the phase rule are described by R. Beckett Denison, in a paper read before the Institution of Electrical Engineers, London, January 30 last, the object being to determine whether the double salt of sodium and magnesium sulphates $(MgSO_4)_2\ Na_2SO_4$ (which has been described as a naturally occurring mineral), is capable of existence in contact with solution; that is, whether it has been formed in nature by the evaporation of saline waters. The corresponding potassium compound is known to occur in Stassfurt as langbeinite, and it was thought that a detailed investigation might result in the isolation of the sodium langbeinite from solution. A transition temperature of 59° C. was obtained for the system $MgSO_4(H_2O)_7 + MgSO_4, Na_2SO_4(H_2O)_4$, but it was found that only the double salt loeweite, $Na_4Mg_2(SO_4)_4(H_2O)_5$, was formed, the usual transition point (71° C.) being depressed to 59° C. by saturation with $MgSO_4$. Dilatometer and tensimeter experiments pointed exclusively to the assumption that the compound, sodium langbeinite, cannot exist in contact with solution, at least below 100° C., and hence this substance, if found as a mineral, must be a product of a higher temperature.

Wages in the Connellsville Region.

For some years past the Connellsville coke region in Pennsylvania has not been under the so-called Interstate agreement, but has been governed by its own rules and customs. Since the consolidation of several companies into the H. C. Frick Company, that corporation has practically controlled the region, the smaller concerns following its lead. The wages paid are based upon the selling price of coke, though this is not strictly followed. Since the present rule obtained in the region there have been several advances in the scale; only one reduction was made, and that was in December, 1903, when the prospects of the trade were poor and coke sold at a low figure. Since that time business has improved, and is now very active.

On March 1 the Frick Company announced a general advance in wages, varying from 8 to 11.5%, and averaging 10%. This example was generally followed by the outside operators, so that the new scale now prevails throughout the district. Under the advance the prices paid for mining are $1.20 per 100 bush. (7,600 lb.) in room and rib coal; $1.37 for heading coal, and $1.45 for coal in wet headings. The rate for charging is 4.25c. per oven; leveling, 11.5c. per oven; drawing coke, 70c. per 100 bushels. Blasters and timbermen are paid $2.40 per day in shafts and slopes, and $2.30 in drifts.

Most of the coke made by the Frick Company is taken by the United States Steel Corporation, to which the company is subsidiary; little, or none, is sold to outside parties. The mining rate is on run-of-mine coal, not screened.

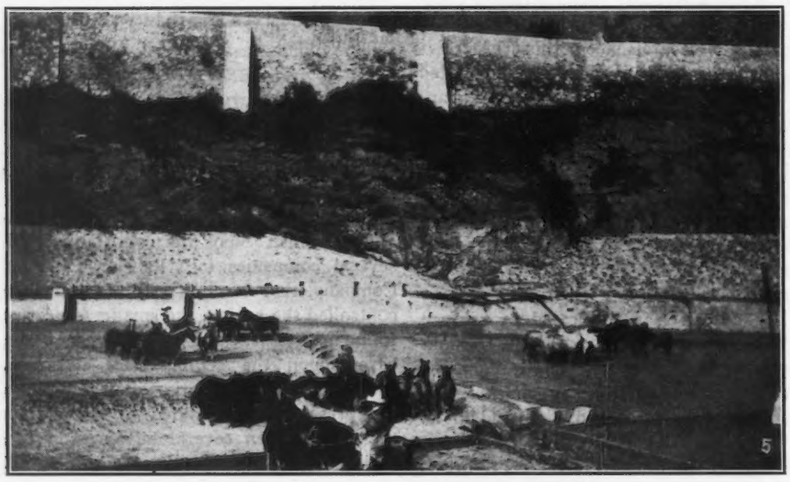
In an older method of fixing the nitrogen of the air, it was passed over calcium carbide. Now the air is passed over a mixture of lime and carbon which is heated in an electric furnace. The result is calcium cyanamide, which can be used directly for a fertilizer.

Hydrofluoric acid is used in glass etching, the etching on glass thermometers being all done with it. It is colorless and looks like water; but a drop on the hand would bore clear through it like a bullet, and its inhalation is certain death.

The Patio Process in 1905.

By James W. Malcolmson.

The *patio* process was introduced in Mexico in 1557, at the Purisima mill in Pachuca, by Bartolomé de Medina. Today, in the adjoining Loreto mill of the Real del Monte Company, the process has reached its highest stage of development and successfully competes with other processes for the extraction of silver from these ores.



PATIO AT LORETO, MEXICO.

As employed at Loreto, the *patio* process enjoys all the benefits of modern methods. The ore, which assays 1 to 1.25 kilograms of silver per metric ton (29 to 36 oz. per ton of 2,000 lb.) and 5 to 6 grams of gold per metric ton (0.14 to 0.17 oz. per ton), is crushed in steel chilean mills and passed through 80-mesh wire-cloth. Repeated experiments have demonstrated that fine grinding is one of the principal factors in obtaining a high extraction of silver. The ore from the chilean mills is concentrated over Johnston tables; the concentrate, assaying 10 kilograms (292 oz.) of silver and 60 grams (1.74 oz.) gold per ton, and containing, therefore, 35% of the total silver and gold in the ore, is shipped to Germany.

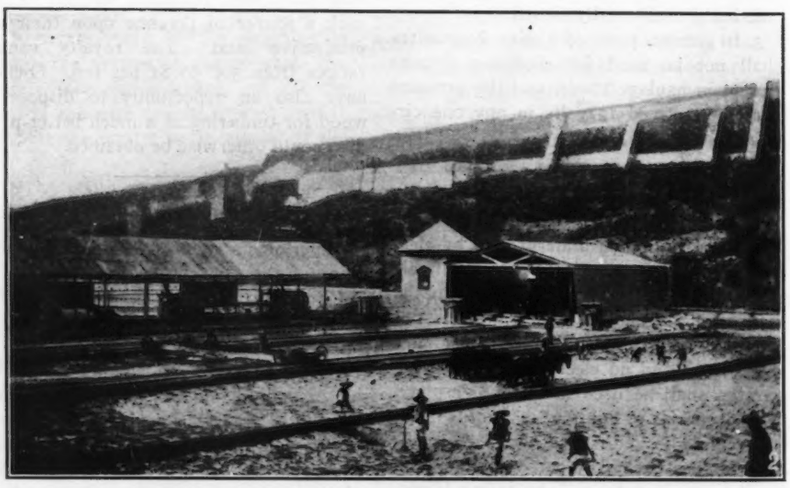
The residue, assaying 800 grams (23 oz.) of silver and 4 grams (0.12 oz.) of gold per ton, is treated in the *patio* in the usual way with salt, sulphate of copper and quicksilver. The *torta* is laid in a long rectangle, 10 in. thick, and resembles in appearance a stretch of muddy road. Instead of horses, plows operated by electric motors move slowly up and down through the *torta*, turning over every part and exposing it to the sun's rays. The extraction is 90% of the silver and 30% of the gold contained after the first concentration.

After amalgamation in the *patio*, the residue is twice concentrated over Wilfley and Johnston tables, the final concentrate, assaying 1.25 kilograms (36 oz.) of silver and 25 grams (0.72 oz.) of gold per ton, being shipped to Mexican smelters. The gold-silver bullion obtained from the *patio* is parted in the Loreto mill with sulphuric acid, the silver being precipitated by copper. The sulphuric acid is manufactured on the ground, and the copper sulphate, obtained as a by-product, is used in the *patio*.

The cost of operations is as follows, in Mexican currency, per metric ton of ore:

Grinding the ore	$0.60
First concentration	0.20
Treatment in the *patio*, including supplies	5.60
Final concentration	0.35
General expenses, power, etc.	1.25
Parting gold from silver bullion	0.60
Total	$8.60

This is equal to $3.90 United States currency per ton of 2,000 pounds.



PATIO AT LORETO, ANOTHER VIEW.

The extraction of the precious metal contents of the ore, which assays approximately 1.25 kilograms (36 oz.) of silver and 6 grams (0.17 oz.) of gold per ton, is:

First concentration	35% of silver,	42% of gold
Amalgamation in *patio*	58 " "	18 " "
Final concentration	2 " "	24 " "
Loss	5 " "	16 " "

Electric power is used throughout the mill and no fuel is required except to retort the silver-amalgam.

It is not unlikely that the introduction of electric power will again place the *patio* process in the front rank for the treatment of clean silver ores in warm, dry climates such as that of Mexico, where there is a scarcity of cheap fuel; and the rejuvenation of the process in Pachuca, the place of its origin, reflects great credit on the ability of the metallurgists of that district to adapt themselves to, and make the fullest use of, new conditions.

The writer is indebted to Mr. Carlos F. de Landero, the director of the Real del Monte Company, for the data given.

The Patio Process.

This old Mexican method for the direct extraction of silver was named from the *patio* or pit, in which the ground ore was intimately mixed with the salt, blue vitriol (copper sulphate) and mercury. The process is frequently performed in the so-called *arrastre*, the common stone-drag mill. The most suitable ores are the single and double sulphides of silver; pyrite, chalcopyrite, galena, and blende interfere, to varying degree, with the reaction. The salt and blue vitriol or 'magistral' together effect a decomposition of the silver sulphide to silver chloride, which is then reduced to metallic silver, which, in turn, is seized by the mercury, forming an amalgam. On the floor of the *patio*, the crushed ore is spread in a flattened cake-like heap called the *torta;* on this account the general process is frequently called 'heap-amalgamation.'

The salt and the blue vitriol afterward are trodden into the ore by mules or horses, one animal being required for 4 tons. This may also be accomplished by mechanical means. The reaction between the salt and the copper sulphate is so vigorous that the ore in the *torta* becomes warm; the resulting cupric chloride has

much to do in oxidizing the silver and preparing it for subsequent reduction and extraction. The mercury is usually added immediately after the copper salt. The *torta* is repeatedly trodden over for several weeks. The amalgam is recovered from the treated ore by washing; the mercury is retorted, and the silver remains behind.

The photographs given herewith illustrate the process as carried out at the Loreto mill (of the Compania Hacienda Real del Monte), having a capacity of more than 1,000 tons a week; more than half of this is treated by mechanical apparatus in the *patio;* but part of the work of salt mixing is still done by horses. The mechanical mixer effects a saving of wages and quicksilver, as compared with the use of animals, but not of time. The mechanical mixer is mentioned in textbooks as an unsatisfactory experiment; and this is said to be the first instance of its successful application. The service is reported very exhausting to animals, though those in the illustrations certainly have the appearance of plump good health. The old *patio* process has done marvelous work in handling low-grade ores under conditions which might not have been approved by scientific metallurgists; and the preservation of this method by the help of mechanical appliance is significant.

Selenium.

It is eighty-seven years since Berzelius discovered selenium in the lead chambers employed in the manufacture of sulphuric acid. This is still the principal source of supply, because pyrite and sulphur used in making sulphuric acid are plentiful, while the rare minerals of the Hartz mountains in Germany, and other selenium-bearing substances, are of limited occurrence. America is not, at present, among the countries that promise to contribute to the future supply, although it is believed that ores found in Colorado and elsewhere may be available as a source of selenium. It is also noteworthy that manufacturing chemists in Germany and France have practically a monopoly in selenium, as in other rare elements, doubtless because research work in those countries is more advanced than elsewhere. It is in Germany that the rare earths, notably thorium, cerium, zirconium, tantalum, osmium, etc., were first recognized as being valuable in the preparation of the filaments for incandescent lamps. America is becoming a field for work in the rare elements, and, though its imports of selenium now amount to only $2,000 or $3,000, there is reason to expect expansion.

Selenium has an atomic weight of 79.1; in the amorphous variety, a reddish-brown powder, soluble in carbon disulphide, its specific gravity is 4.26; when crystalline, obtained by heating the amorphous variety to 97° C., it is dark gray in color, and has a specific gravity of 4.8. Selenium is a poor conductor of electricity, and when heated the resistance of the metalloid is increased. Exposure to light, however, will instantly increase the conductivity of the metalloid—a fact that has suggested the photophone, an instrument for transmitting sounds and pictures to a distance, and the selenium-cell for automatically lighting and extinguishing lamps. Other minor uses for selenium salts have been found, but as yet the demand is small. The value of selenium, f. o. b. makers' works in Germany, is about $13.33 per kg. for metal in sticks and powder, and $28.56 for sublimed powder. Compared with other rare elements, the prices quoted for selenium are reasonable, favoring chemical research work to encourage the consumption.

Transvaal Mining Costs.

Official reports for the year ending July 31, 1904, have been received from three closely allied Witwatersrand mines, namely: the Langlaagte, the Glen and the Nourse Deeps. As these properties are all under the same management, and their reports are identical in make-up as well as uniformly detailed and complete, we can conveniently present their essential features by a series of comparative tables.

Mining costs are calculated on the basis of dollars per ton mined:

Operations:	Langlaagte.	Glen.	Nourse.
Ore mined.....Tons.	205,354	169,282	158,430
Drifts and crosscuts Ft.	2,621	3,316	3,708
Shafts, raises, etc..Ft.	1,649	1,238	2,315
Reserves .....Tons.	737,545	387,760	434,329
Costs:			
Stoping.....	$1.75	$1.42	$1.71
Tramming, etc.....	.75	.66	.96
Hoisting.....	.30	.30	.40
Pumping.....	.12	.12	.15
Development.....	.31	.39	.61
General.....	.22	.22	.24
Total mining.....	$3.45	$3.11	$4.07

The operation of the milling and cyaniding plants is summarized below. The 'day' has a length of 24 hours. The product of the stamps is concentrated before leaching.

	Langlaagte.	Glen.	Nourse
Percentage of waste...	1.79	3.97	19.58
Tons crushed.....	201,508	163,010	149,230
Number of stamps....	110	95	90
Average running days.	348.6	351.1	343.8
Duty per stamp per day	5.3	4.9	4.8
Total tonnage cyanided	199,946	161,106	148,541
Efficiency of extraction	76.25	80.33	78.02
Percentage yield from mill.....	64.70	54.20	60.52
Yield from concentrate.	9.82	10.85	13.98
Yield from sand.....	21 55	28.39	19.48
Yield from slime.....	3.93	6.56	6.02
Total yield, fine ounces.	662,25	66,378	65,581

Recalculating the cost of mining to the basis of tonnage milled, the operating expenses may be stated thus, in dollars per ton crushed:

	Langlaagte.	Glen.	Nourse.
Mining.....	$3.52	$3.25	$4.32
Milling.....	.52	.62	.73
Cyaniding.....	.47	.63	.70
General.....	.48	.47	.62
Total costs.....	$4.99	$4.97	$6.37
Total revenue.....	6.64	8.23	8.88
Working profit.....	$1.65	$3.26	$2.51
Increase over 1902-03.	.18	1.39	.95

All three companies have sustained a loss of gold 'commandeered' by the South African Republic. Suits to recover the insurance on this bullion were carried into the House of Lords and were decided in favor of the underwriters. The companies are capitalized at £750,000, £600,000 and £450,000 respectively.

New Carborundum Products.

Attention is being called to the utilization as a refractory material of carborundum, which is produced by fusing coke and pure silica in the electric furnace at Niagara Falls. As an abrasive carborundum has already established the reputation of being superior to emery by reason of the fact that 1 lb. of the former equals 3 lb. of the latter, relatively speaking. From eight short tons reported in 1893, the production of carborundum has increased to 3,500 tons in 1904, while the price, influenced by the larger domestic and European consumption, has fallen from an average of $2,125 per ton to $200 in 11 years. At present carborundum grains are quoted at 10c. per lb., and powder at 8c., f. o. b. Niagara Falls, New York. The expansion in production and the large discount in selling price are suggestive factors that indicate the competition of carborundum with emery, corundum, crushed steel, and like abrasive materials.

In recent years several patents have been issued in this country and abroad for refractory brick, cement and other articles whose principal constituent is carborundum. Generally speaking, pulverized carborundum is mixed with a binder of clay, an alkali silicate and lime. In patents issued to the Carborundum Co. (Great Britain 9,963 of 1904) and to Frank J. Tone (United States, 772,262), however, no admixture is used, the cohesion required being attained by subjecting the superficially oxidized particles of crystalline or amorphous carborundum to a high temperature in the electric furnace. Aside from the regularly shaped refractory articles, carborundum firesand, specific gravity 2.7, mixed with No. 1 fireclay and a solution of sodium silicate, serves excellently as a coating or lining for brass, lead, copper or other high-temperature furnaces. Advantages claimed in this direction are simple construction, by molding the entire lining into place, freedom from joints, and durability. Carborundum firesand is worth $1.05 per 100 lb., f. o. b. Niagara Falls, which is much less than the cost of ordinary fireclay.

As a mixture in steel (French patent 344,906, July 13, 1904), W. Kaufmann and A. Bouvier state that the silicon carbide is introduced in equal quantities at regular intervals into the molten metal as it runs into the ladle or mold. The molten metal should be as hot as possible, and free from slag; otherwise the carbide will be decomposed. The proportions of carbide used are 0.11 to 0.12% for steel for tires; 0.37 to 0.39% for molded steel; 0.075 to 0.08% for mild basic steel.

Books Reviewed.

Jaarboek van het Mijnwezen in Nederlandsch Oost-Indië. Prepared by the Technical Administration of the Netherlands, East Indies. Batavia, Java; State Printing Office. Two volumes, 144 and 544 pages; with large atlas and large folded map.

This elaborate report of mining progress includes: A small volume (145 pages, in Dutch) devoted to technical and administrative detail; a larger volume (542 pages, with index, in German), giving the results of a detailed exploration of the petrographical, mineralogical and stratigraphical geology of certain parts of West Borneo. Indeed, this is almost a treatise on petrography, supplemented as it is by a folio of 21 plates comprising 126 exquisite micro-photographs of rock sections. This is by J. Wing Easton. There is also a large atlas of 12 sheets of geological maps, sections and profiles.

The whole publication is naturally under government direction. It is encouraging to note the deep interest displayed in the technical and geological survey of the Dutch possessions.

American Tool Making and Interchangeable Manufacturing. By Joseph V. Woodworth. New York; Norman W. Henley Publishing Company. Pages, 535; illustrated. Price, $4.

This is from the hand of a man who knows the lathe as well as the pen. The writer has previously given the public treatises on 'Dies; Their Construction and Use,' and 'Hardening, Tempering, Annealing and Forging of Steel.' This book is "dedicated to the work-bench of the mechanic and the office of the engineer." The guiding idea is the modern mechanical conception of the manufacturing of interchangeable parts, and the making of these on a few fundamental machines.

The 23 chapters deal with details which can be fully appreciated only by the practical machinist, but they carry a commendable wealth of device, adaptation and suggestion which are all the more valuable because of their grouping in form convenient for reference. The index shows painstaking to a worthy degree. An interesting feature is the machining of aluminum (which has vexed many a worker who is competent with other metals). The book is commended as well worth the price to the student and the worker.

A Handbook for Superintendents of Construction, Architects, Builders and Building Inspectors. By H. G. Richey. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 748. Price, $4.

This neat, leather-bound pocket manual of construction is written by one who has served as superintendent of construction for public buildings of the United States Government. The ground covered comprises the essentials from excavation and foundation, stone, brick and cement work, through timber, plumbing, metal and electric work, hydraulics, strength of materials, etc., to laying out of the work. One disadvantage of many of these manuals (as unfortunately illustrated by Kent, Trautwine and Foster) is the tendency to overload with really valuable material, which forces the whole into fine print. One advantage of this manual by Richey is that he has wisely kept nearly all of his material in print sufficiently coarse to be available. The book is prefaced with a short bibliography and a list of the municipal building codes quoted; it is concluded with an index of 50 pages, which handles 695 pages of reading matter—an index ratio of one-fourteenth, not an inconsiderable matter in a book of this sort. The book will serve as a standard convenience for builders, superintendents and inspectors.

United States Geological Survey. Bulletin No. 242. Geology of the Hudson Valley Between the Hoosic and the Kinderhook. By T. Nelson Dale. Washington; Government Printing Office. Pages, 64; illustrated.

This monograph treats of a strip of the Hudson valley between the Hudson river on the west and the Rensselaer plateau and the Taconic range on the east. It has an area of about 315 square miles, situated mostly in Rensselaer county, but partly in Columbia county, N. Y. This area presents several geological problems which have long been in process of solution. These are the delimitation and age of the several formations, the orders of their local deposition, and their present structural relations. These problems would be easily solved but for the rarity of fossil localities and the obscure character of many of the fossils, the petrographic similarity of beds belonging to several formations, the minor overturned folding which marks almost the entire belt, the reverse faulting in places, and the general prevalence of glacial deposits. The publication of this paper carries out a design originated by Prof. Raphael Pumpelly, while in charge of the Archean division of the Geological Survey, to study carefully a belt, from 20 to 40 miles wide from north to south, extending from the highly metamorphic zone of the Green Mountain range to the zone of unaltered sediments at the Hudson river. Previous monographs of the Geological Survey marked the execution of the more important part of this plan, and the present paper completes it.

This paper does not claim to be exhaustive, but is intended to facilitate more minute explorations by others, as well as the extension of the work southward and northward. It is offered as a contribution chiefly to the stratigraphy of the region, paleontological investigations having been made entirely subsidiary to that and having been confined to the reference of fossils to paleontologists for determination.

United States Geological Survey. Bulletin No. 261. Preliminary Report on the Operations of the Coal-testing Plant at the Louisiana Purchase Exposition. Edward W. Parker, Joseph A. Holmes, Marius R. Campbell, Committee in Charge. Washington; Government Printing Office, 1905. Pages, 172.

The coal-testing plant established at St. Louis, and still in operation, is one of the most valuable results of the Louisiana Purchase Exposition. It has undertaken tests of coal of all kinds on a scale never tried before, and the work has been thoroughly and carefully done, under the charge of a number of experts in various lines. Thus the collection of coal and the sampling at mines was under the direction of Mr. Campbell, of the committee. Dr. N. W. Lord had charge of the chemical laboratory. The washing tests were made by John D. Wick, the steam tests by L. P. Breckenridge, the coking tests by F. W. Stammler, and the briquetting tests by Joseph Hyde Pratt. Finally Robert H. Fernald conducted the tests of producer gas. All of these tests are described in separate chapters, and the comparative results are carefully tabulated in this *Bulletin,* in successive chapters. These are accompanied by an introduction, describing the plant and outlining the division of the work, the importance of which is well stated.

Probably the most important section is that giving the results of the producer-gas tests, and showing the advantages and economies obtained by using the gas for the production of power. The report, however, deserves careful study in all its sections, and is a valuable contribution to the practical knowledge of American fuels.

We hope to present some of its conclusions to our readers later. It is understood that this, which is the preliminary report, is to be followed by a monograph giving a fuller account; but this will not be done until further experiments have been made, and some of the tests have been repeated, to secure the nearest possible approach to complete and accurate results.

Expériences sur les Lampes des Sureté. By V. Watteyne and S. Stassart. Extract from *Annales des Mines de Belgique,* Vol. IX. Brussels, Belgium, 1904; published by the Ministry of Industry and Labor. Pages, 336; illustrated.

This pamphlet gives in detail the results obtained and the conclusions reached from a large number of experiments on various types of safety lamps carried on at the testing station erected by the Belgian government at Frameries, under the supervision of Victor Watteyne, director

of mines. The two most important problems under investigation at the testing station are, first, the safest and best explosive for use in fiery and dusty workings, and, second, the best devices for lighting such workings. This book describes experiments undertaken for the sake of testing the value of three clauses in the government regulations dealing with the use of safety lamps in gaseous mines. These clauses, believed to have outlasted their usefulness, required (1) the use of pure vegetable oil only, (2) the sending of extinguished lamps to surface or to some determined station underground, and (3) the exclusive use of the Mueseler lamp where gas is given off freely. The authors preface the description of their experiments by summarizing the conclusions of other investigators, from the committee of the North of England Association of Engineers, in 1868, to Mr. Fähndrich, of Gelsenkirchen, in 1899-1901. Of the authors' conclusions, it suffices to say that they fully proved the uselessness of the three clauses mentioned. As a result of the experiments, the Belgian mining regulations have been amended; several types of lamps are permitted in fiery places, while the unbonneted Mueseler, previously the standard, is excluded. The experiments and the conclusions reached are of value to colliery managers and engineers in this country, since the latest types of gasolene-burning lamps were tested as well as the old Davy and the Clanny. The Frameries testing station, by this work done under conditions which insured reliable results, has justified its existence.

A Manual of Mining. Fourth Edition. By M. C. Ihlseng and Eugene B. Wilson. New York; John Wiley & Sons. London; Chapman & Hall, Ltd. Pages, 740; illustrated. Price, $5.

The first edition of this book, issued in 1891, was the outcome of a series of lectures delivered by Mr. Ihlseng at the Colorado School of Mines. The present edition has been much enlarged, bringing the contents up to date, and also including much matter on coal mining, to which only brief references were made in the first edition. The book is divided into two parts, the longer section (504 pages) being on mining engineering. It includes prospecting, preparatory work, methods of mining, power in its various phases, hoisting, pumping, underground haulage, transmission of power, air compression, ventilating, lighting and mine accidents. The second part, on practical mining, has sections on shafts, drifts and galleries, timbering, miners' tools, mining machinery, and blasting. The distinction is not altogether clear; that is, it is not always easy to see why a subject has been included in one section rather than the other. This makes little difference, however, as long as it is adequately treated.

The book is marred by some errors, which we take to be those of the proofreader chiefly, for we can hardly think that the authors would give incorrectly the name of a man so well known as Dr. Raymond, or that they would speak of marketing "the very low-grade ores of Wisconsin and Minnesota." Such ores may be mined and marketed some time in the future; at present the 55 and 60% ores of the Mesabi and the Gogebic cannot be classed as "very low grade," and they are the ores marketed. Apart from this, there is much good material in the book, and it has been compiled and arranged with care, and generally a judicious selection of material. The diagrams and illustrations are generally good. In the section on power, a more extended comment on gas and oil engines might have been useful; but it is difficult to include everything without making a book too bulky. Appended to most of the chapters are references to authorities, which is a useful feature, where further information is desired. A glossary of mining terms is given in an appendix, which is also useful.

Annales des Mines de Belgique. Prepared by the Ministry of Industry and Labor. Brussels, Belgium, 1904; L. Narcisse. Pages, 387.

This is Part 4 of Vol. IX, and includes pages 797 to 1,384. The content is devoted to four monographs, as follows, namely: Radio-activity, safety lamps, explosives, and ignition of firedamp by explosives. The treatise on radio-activity is by J. Daniel, and is a readable summary of the nature and properties of the discovery by Monsieur and Madame Curie. The paper on safety lamps is the longest and most valuable of the volume; it covers 304 pages, and is prepared by V. Watteyne, director of mines, and S. Stassart, master engineer of mines. The subject covers a long and exhaustive comparison regarding both the illuminating power of vegetable oils and the safety of lighting by explosive friction (in presence of firedamp) of many special lamps; the Fumat and the Body-Firket seem to have exhibited the most desirable qualities. In view of the ever-present coal-mine accident, with its melancholy horror, the paper should be studied by all superintendents who have charge of gas-bearing mines.

Transactions of the American Society of Mechanical Engineers. Vol XXV. New York, 1904; published by the Society. Pages, 1,148; illustrated.

This bulky volume comprises the proceedings of the 24th annual (the 48th regular) meeting in New York, December, 1903, and of the Chicago meeting, the 49th, in June, 1904. The former meeting presented a list of 18 papers, besides administrative business and reports; and the latter meeting furnished 20 papers. An enumeration shows that the engine (including the stationary, the locomotive, the gas and the turbine varieties) claims the first attention; it furnished material for no fewer than 14 papers. Chemical utility and machine construction and practice came next, each claiming seven papers. Building named three; business, three; electrical, two; and others scattering, as, ordnance, one; general, one, etc. The high level of most of these papers is measured by the thought of one of the presidential addresses (that of James M. Dodge) to the effect that preliminary school preparation in technical training has a distinct money value. Such an assemblage of men and matter as that represented by the transactions of this Society should constitute a distinct contribution to scientific literature; but despite the commendable editing which the volume has received, the absence of any index at all in keeping with the size and the volume is—perhaps not criminal, but certainly suicidal. The scant index covers only 7 pages, while the list of illustrations (not classified) counts 11 pages. The loss is measured by the worth of the contents.

Books Received.

In sending books for notices, will publishers, for their own sake and that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Cement and Concrete. By Louis Carlton Sabin. New York; McGraw Publishing Company. Pages, 508. Price, $5.

Die Bergwerks Inspektion in Oesterrisch. 1901. Prepared in the Ministry of Industry. Vienna, Austria; Public Printer. Pages, 440.

Missouri. Biennial Report of the State Geologist. E. R. Buckley, State Geologist. Jefferson City, Mo.; State Printers. Pages, 56; with maps.

Western Australia. Statistical Register for 1903. Part VI. Prepared in the Government Statistician's Office, Perth, W. A.; Government Printer. Pages, 48.

South Australia. Agricultural and Livestock Statistics. 1903-1904. By L. H. Sholl, Government Statist. Adelaide, S. A.; Government Printer. Pages, 92.

Instituto Geologico de Mexico. Papers, Nos. 1-6. By Andres Almarez, Ernesto Augermann, Emilo Bose, Ezequiel Ordoñez and Juan D. Villarello. Pages, 208; illustrated.

Western Australia. Report of the Department of Mines for 1903. L. L. Crockett, Under-Secretary for Mines. Perth, W. A.; Government Printer. Pages, 276; illustrated.

Labor and Industrial Chronology of the State of Massachusetts. 1904. *Part III.* Prepared by the Bureau of Industrial Statistics. Charles F. Pidgin, chief. Boston; State Printers. Pages, 160.

Geologic Atlas of the United States. No. 117. Casselton-Fargo Folio, North Dakota-Minnesota. Washington; engraved

and printed by the United States Geological Survey. Six maps and 8 pages text.

United States Geological Survey. Bulletin 244. Contributions to Devonian Paleontology. By H. S. Williams and E. M. Kindle. Washington; Government Printing Office. Pages, 144; illustrated.

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Die Entwickelung des Niederrheinisch-Westfälischen Steinkohlen Bergbaues. Vol. X. Wirtschaftliche Entwickelung. Teil I. Pages, 300, with 14 plates. *Teil II.* Pages, 344, with 3 plates. *Teil III.* Pages, 372, with 3 plates. Prepared by Joint Committees of the Verein für die Bergbaulischen Interressen im Oberbergamtsbezirk Dortmund, Westfalischen Berggewerkschaftskasse and the Rheinisch-Westfalischen Kohlensyndikat. Berlin, Germany; Julius Springer. Price, for the three volumes (in New York), $56.

Speed of Travel.—A contemporary, *The Electrical World,* jocularly asks: "Is it seemly that smelly little automobiles should rip off miles in 35 to 40 seconds over a sandy beach, while engineers hesitate at similar speed over a smooth track, backed by an entire power station?" But the cost, and horsepower, per passenger per mile are not stated. The recent German tests required, for only one car carrying 60 passengers at 110 miles per hour, 1,300 horsepower. The old cent-a-ton-a-mile rate was possible for slow speed; but when we double the velocity the physical resistance is quadrupled, and the economic resistance may be cubed. Moreover, the margin of safety is worth considering; the railroads and the electric roads have an enviable record of low mortality. The frequent deaths of dare-devil automobile racers teach us that poverty has its advantages. The keynote of progress in some cases is not decrease of expenses, but increase of earnings; and that, in a word, means tonnage, even of passengers. The passenger is a live-freight weight; his comfort and safety must be provided for; yet he loads and unloads himself, and the cent-a-ton-a-league rate ought to be an accomplishment in the passenger service of the near future, and with good speed on express trains.

Correspondence.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

A Disclaimer.

Sir—I am in receipt of a circular promoting the John Thomson mine, in which it appears that I am a director of the United Mining & Investment Company and an interested party. I desire to say that I am not a director of the company or interested in any way, and that the use of my name in said circular was unauthorized.

J. Waldo Smith.

New York, March 16, 1905.

Burdens on Mexican Mining.

Sir—Mine owners and miners in the Republic of Mexico are now face to face with great and grave difficulties, which will strangle the mining industry, unless strong measures are taken, and that promptly, to defeat the aims and intentions of certain unscrupulous financiers and monopolists who are rapidly gaining a foothold in this country. It is only by combination and organization that this can be done, for, to the individual, it is too great and expensive a task. Therefore, I ask that you will be good enough to publish this letter in your invaluable paper, as it is well known that you have the future welfare of the best-governed country in the world at heart.

At the present moment we have two separate and distinct grievances, the first of these being the Smelting Trust, which today is exacting such high treatment charges that it is compulsory for a great number of mines, especially in the Parral district, to shut down; this causes widespread distress among the working classes and loss of money to the men who have endured hardships and privations in their efforts to open up the country.

Then we have the Cyanide Company, which has secured a decision from the court, giving it a monopoly over cyanide treatment. The court, however, in giving a decision, was hampered by the fact that it had all the evidence in favor of granting the concession laid before it, and none of the evidence against, as it was a non-contentious suit. The acquisition of the monopoly is immoral, and if the evidence, as given in South Africa and Western Australia, and afterward before the English House of Lords, had been in the hands of the court this decision would, I believe, never have been given.

I would suggest the immediate formation of a Mine Owners' Protection Association, whose objects will be to watch any innovation in connection with the mining industry, so that at the time of any concession affecting the industry being applied for, they will be represented by counsel who will give to the Government the opinion of the men to whom the granting or non-granting of such concessions is of such vital importance.

I would like to mention that I know of one case in my district where the users of cyanide are paying as high as 6% on gross output to the London company. On London being approached, at my instigation, at the end of last September, with a view to modifying the terms of the contract, an answer was given to the effect that, as the books of the company were not closed until December 31, nothing could be done until after that date. Comment is superfluous.

You are probably aware that the New Zealand Government paid £30,000 for the entire rights of the MacArthur-Forrest Company. This transaction took place about ten years ago, and gave the New Zealanders the free use of the cyanide process. In Western Australia the Cyanide Company demanded no less a sum than £80,000 for its rights. It was decided by the government of Western Australia, with the strong co-operation of the mine owners, to fight the company; a final appeal being made to the Appellate Division of the House of Lords resulted in a victory for the men who bear the brunt of the battle—the miners. In nearly every case in the United States of North America where the suppositious owners of the cyanide patent have come into contact in a legal way with men who have had the sinews of war at their disposal, a compromise has been effected for a very small sum. This goes to prove that they are not sure of their own case, as the original patent in the claims of MacArthur-Forrest was faulty.

I therefore ask to use your paper as a medium to invite correspondence, and I would suggest that a committee be appointed and officers elected to draw up articles of association and to fix the amount of subscription as soon as possible. The vital importance of protecting the greatest industry in the Republic of Mexico is my excuse for requiring so much of your space.

Frederic J. M. Rhodes.

American Club, Mexico, Feb. 28, 1905.

Beckelite is the name of a new mineral; it is a complex silicate of calcium, with the old triad, cerium-lanthanium-didymium. It is named after a European scientist.

The behavior of radium is part of the problem of the exhaustion of the substances out of which the working energies of practical life are supplied. Is there not an analogy to the unwasting force of radium in the familiar phenomenon of the grain of musk, which will give out for years a strong perfume, so strong as to cause faintness in some sensitive subjects, and yet suffer no appreciable loss of weight?